THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

VOL. 23 NEW YORK, JULY, 1925 No. 7

American Electro-Platers' Society Convention

Thirteenth Annual Convention, Held in Montreal, Canada, June 29-July 2, 1925

Written for The Metal Industry by PETER W. BLAIR, Montreal, Canada

The lobby of the Mt. Royal Hotel on Sunday afternoon, June 28, 1925, began to assume a bright aspect as the delegates to the thirteenth annual convention of the American Electro Platers' convention came in. The first delegates to arrive were the advance guards from New York and Philadelphia. When the western delegates from Chicago and St. Louis reached the hotel after their long trip, fresh and full of vigor, the local committee began to realize that its labors had not been in vain. No pains were spared for the comfort of the delegates and the ladies who accompanied them. The local committee attended to all details so that each and every one would have a profitable and enjoyable time.

MOUNT ROYAL HOTEL CONVENTION HEADQUARTERS

The convention was called to order by the Chairman of the Committee, John H. Feeley of Montreal. He introduced Alderman Louis Rubenstein, who said that Montreal was the finest city on the American continent for conventions. It has the atmosphere as well as the location. Alderman Rubenstein suggested that the delegates visit the many points of historical interest during their visit in town and turned the keys of the city over to the delegates with the freedom of the city.

William Birks, past president of the Board of Trade welcomed the delegates on behalf of the business men of Montreal and the Board of Trade. Supreme President Frank J. Hanlon of Chicago responded to the addresses of welcome. Charles H. Proctor of Arlington, N. J., founder of the Society and Plating Chemical Editor of THE METAL INDUSTRY, impressed on the delegates the importance of constructive and not destructive meetings, so that all who attended the meetings could carry something back with them to their daily work and a message to their local branch societies. An address was made by Past Supreme President John E. Sterling of New York City. The Annual Address was given by Supreme President Frank J. Hanlon. Minutes of last regular meeting, reports of officers, appointing of committees by Supreme President, presentation and reading of all resolutions were heard.

Delegate Gehling of the Philadelphia Branch started the ball rolling with an inspiring talk, showing if one department head from a plating department of a manufacturing concern was added every year the labor and money were well spent. All the delegates joined this discussion and were strong for continuation along better business lines, such as furnishing executives of manufacturing concerns with a list of the different papers that would be discussed at these conventions in place of the souvenir official program.

The Secretary read copies of amendments to the constitution which had been placed in his hands and they were turned over to a committee which was to meet at 8 a. m. of the next day and report at 10 a. m. The meeting adjourned until 8 p. m.

At that session the meeting was called to order by Past Supreme President Sterling, who introduced the following gentlemen, who read papers:

Walter S. Barrows, Secretary Toronto Branch, "Treatment of Carbonized Steel and Alloys."

John Young, Toronto Branch, "Plating Soda Fountain Fittings."

Thomas O'Keefe, Toronto Branch, "Sheffield Plate."

Ray Goodsell, President, Milwaukee Branch, "Spotting Out."

F. C. Mesle, Editor Monthly Review, "Stripping Nickel Deposit from Steel."

C. I. Thomas and Dr. William Blum, Bureau of Standards, Washington, D. C., "The Protective Value of Nickel Plating."

The second day's session was called to order at 9 a. m., Supreme President Frank J. Hanlon presiding with one of the largest attendances of delegates and members. After a short business session, Dr. Blum gave a strong talk featuring with research work of the Bureau of Standards done with its limited appropriation. He has the entire organization behind him morally and spiritually and when the different delegates get back to their respective homes they are to work along political lines in taking this matter up with the congressmen and senators in their respective districts. The United States is now the leading manufacturing country of the world. Action also will be taken before this convention adjourns along some line of financing it in conjunction with the manufacturers and the American Electrochemical Society.

Dr. Blum then read a very interesting and instructive paper, the subject of which was Nickel Plating of Zinc and Zinc Base Die Castings.

George Hogaboom presented the next paper on Brass Plating.

At noon the session adjourned for luncheon and at 2 p. m. the business session was resumed. Meeting was called to order by Vice-President Smith.

A. P. Munning, 2nd, "Blackboard Talk on Alkaline Cleaners."

Oscar E. Servis, Chicago, "Impurities in Nickel Solutions."

A. Pearson, "Zinc Cyanide or Zinc Sulphate Solutions."

The evening session was called to order by Vice-President Steuernagel. Papers were read as follows:

Charles H. Proctor, Founder, "Some Aspect of the Electro-Deposition of Cadmium."

F. W. Olmstead, Consulting Chemist, New York, "Chromium Plated Ware."

Dr. William Blum, "Electrode Potentials and Polarization."

Dr. Stanislaus Skowronski, Chief of Research, Raritan Copper Company, "The Story of Copper and Its Alloys, from the Mine to the Consumer, by Moving Pictures."

Papers were received from the following and were read at suitable times:

"Plating on Aluminum," by E. G. Lovering, Detroit Branch.

"Metallizing of Non-Metallic Substances," by Elias Schorr, New York Branch.

"Silver Galvano-Plastic Work," by R. E. Massicotte, New York Branch.

"Gold Coloring High Class and Cheap Jewelry," by E. L. Tannert, New York Branch,

:"Ormulu Gold Finish on Soft Metal Figure Work," by E. L. Tannert, New York Branch,

"Forty-four Years' Experiences of a Silver-Plater," by Amos G. Reeve, "Some Experiences of a Job Plater," by R. J. O'Connor, Secretary, Bridgeport Branch.

ASSEMBLED DELEGATES IN MONTREAL, CANADA

"Brass Plating Trunk Hardware," by Ernest Cole, Toronto Branch.

"Controlling Brass Solution," by Charles H. Bohler, Newark Branch.

"Silver Plating Solution," with Lantern Slides, by F. H. Nordman, Cincinnati Branch.

"Climbing," by W. F. Faint, Newark Branch.

"Nickel Solution," by Oliver Sizelove, Newark Branch.

On Wednesday, July 1, a business session was held following which an official photograph was taken at 11 a. m. The annual baseball game was played, in which the U. S. A. International Champions, composed of players from the West, were lined up against Canada, and the Canadians won by a score of 6 to 1. From the score it is clear that the game was excellent and the losers were not disgraced. In the afternoon a motor-bus drive was held for the purpose of sightseeing and visiting the Harbor front.

In the evening the big Banquet was held and a glorious time was enjoyed. J. H. Feeley, chairman of the Convention Committee acted as toastmaster to 400 diners, the largest gathering ever held under the auspices of the American Electro-Platers' Society. Community singing was led by Joseph Beauchamp, whose voice could be heard all over the banquet room. The speaker of the evening was F. H. Callaghan, his subject being, "Dominion Day and What It means." He recounted the early progress in Canada and traced its development up to the present day.

ELECTION OF OFFICERS

On Thursday, July 2, a business session was held at 9 a. m. at which the Committees presented their final reports and new officers were elected. These officers are as follows:

Supreme President, **E. J. Musick,** St. Louis, Mo.

First Vice-President, **George Gehling,** Philadelphia, Pa.

Second Vice-President, **John H. Feeley,** Montreal, Canada.

Secretary-Treasurer, **Robert Steuernagel,** Milwaukee, Wis.

Editor the Monthly Review, **F. C. Mesle,** Rochester, N. Y.

NEWARK THE 1926 CONVENTION CITY

By a unanimous vote of all the delegates, Newark, N. J., was chosen as the city for the Fourteenth Annual Convention, to be held in 1926.

In the afternoon points of interest in Montreal and industrial plants were visited. In the evening the last meeting was held at which the newly elected officers were introduced and prizes for papers and exhibits were held. These ceremonies were followed by dancing. Communications were received from a number of friends of the Society, among them Walter C. Gold of Philadelphia, who praised its work and mentioned in particular, the educational effort of the Conventions. He named the book Principles of Electro-Plating and Electroforming by Blum and Hoga-

AT THE THIRTEENTH ANNUAL CONVENTION OF THE AMERICAN ELECTRO-PLATERS' SOCIETY

boom as a concrete result of the Society's Conventions. Mr. Gold also recommended that a National Special Committee be appointed on Health and Health Protection of the men engaged in electro-deposition of metals. Useful and unique prizes were distributed during the Banquet by the various exhibitors and supply houses represented.

PRIZES AND AWARDS

The Founders Gold Medal was awarded to Walter Fraine of Dayton, Ohio. A telegram was sent to Mr. Fraine notifying him of the high honor conferred upon him. The second prize was awarded to J. Miller of New York and the third prize to F. Horath of St. Louis.

NEW SUPREME OFFICERS OF THE AMERICAN ELECTRO-PLATERS' SOCIETY

E. J. MUSICK,
President

GEORGE GEHLING,
First Vice-president

ROBERT STEUERNAGEL,
Secretary-Treasurer

F. C. MESLE,
Editor, The Monthly Review

CHARLES H. PROCTOR,
Founder

F. J. HANLON
Past President

Charles H. Proctor made the introductory address and presented the prizes.

The exhibits were of an unusually high order and showed the high character of the work done by the Society and its members. The first prize for exhibits was awarded to Frank Green, Montreal; second prize to F. L. Greenwald, Chicago, and the third prize to R. L. Goodsell, Milwaukee. E. Lamoureaux of Chicago introduced the prize winners and presented the awards.

THE EXHIBITION AND WHAT THEY EXHIBITED

Oakley Chemical Company, New York. Samples of different classes of work in metal goods treated with these cleaners, including automobile parts and trimmings. Featuring this display was a line of plumbers' sanitary supply goods manufactured by two local concerns, James Robertson Company and W. Cuthbert Company, Montreal.

Roessler & Hasslacher Chemical Company, New York. Metal articles plated with cadmium.

Lasalco, St. Louis, Mo., Buffs, polishing wheels, tripoli, white finish, and a full line of products. Featuring this exhibition was a speed motor.

LADIES' PROGRAM

The ladies had a varied and enjoyable program. They attended some of the opening meetings, went on shopping trips, theatre parties, visited art galleries, took motor-bus drives, attended the baseball game and, of course, the banquet, entertainments and dance. As usual, they were amply entertained and enjoyed themselves in every way.

NEWARK TRIP

It was announced that on Saturday, August 8, under the auspices of the Newark Branch of the American Electro-Platers' Society, a sightseeing trip would be held through the Raritan Copper Works at Raritan, N. J. This trip will be directed by Dr. Skowronski, Chief of Research

of the Raritan Copper Works. Everyone is invited. All those interested can get full information by writing to George B. Hogaboom, care of the Hanson and Van Winkle Company, Newark, N. J.

INTERNATIONAL FELLOWSHIP CLUB

The plating supply salesmen met and dined on Saturday, June 28, at 7 p. m. Between 15 and 20 sat around a table and discussed the organization of their society. It was decided to call it the International Fellowship Club. Meetings will be held once a year, and none of the proceedings will have any connection with the American Electro-Platers' Society, the Fellowship Club being an entirely independent body. Officers elected were W. S. McKeon, chairman; George Lawrence, vice-president; John C. Oberender, secretary. Information can be obtained from Mr. Oberender at 185 Church street, New Haven, Conn.

Chairman Feeley was congratulated on his work in running the Convention. All the arrangements went off smoothly and the meetings were among the best ever held by the Society. He was not the only busy man in Montreal, however, Charles H. Proctor and Dr. Blum working from morning until midnight.

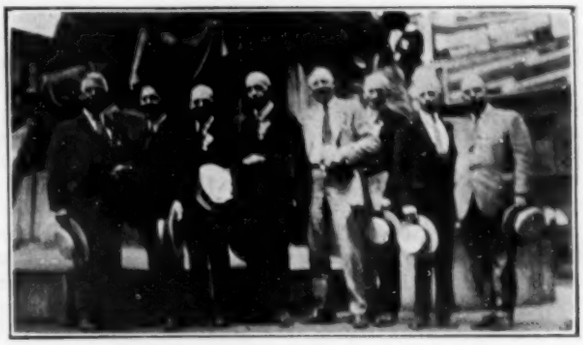
George B. Hogaboom, as usual, delivered his paper without notes, and also, as usual, read one of the best papers at the meeting. Many new faces were present, proving that the Society is growing steadily from year to year. Delegates stated that E. Lamoreaux's speech was one of the best delivered at the Convention. President Hanlon coined a new slogan for the Society, "Efficiency, Stability, A. E. S."

WALTER FRAINE
Founder's Medal Winner

The Mueller Manufacturing Company showed its progressiveness by sending three representatives to the Convention, Otto Halmbacher of Chicago, W. Wilkins, Chicago, and Frank Powers of Detroit.

It was stated on reliable authority that the weather was good and that nobody got wet inside or out. It was the best educational convention ever held by the American Electro-Platers' Society.

On to Newark and the Fourteenth Annual Convention of the most wide-awake society in the United States.



PAST PRESIDENTS OF THE SOCIETY

A Toast to Montreal

(Read at the Banquet by E. G. Lovering, Detroit Branch)

Oh, Montreal to you I toast
Your gentle charms I'm proud to boast,
To me you're just the sort of town
Where I'd be glad to settle down.
And so it is with me today,
Amidst your charms I love to stay.
Your lakes and your river grand
Make a wonder trip to a wonderland;
Your Mount Royal upon the hill
Will give the most sedate a thrill,
I've ridden in your "Caleche"—a treat,
Your sights are grand, they can't be beat,
Hotels are great—"cuisine" superb,
I've enjoyed them all; I feel like a bird.
Your wine is fine, your "ale" immense,
I've spent all I had but thirty cents,
And going home just makes me sore,
To think of going back to that 4.4.

A COOL VIEW—LACHINE RAPIDS NEAR MONTREAL, CANADA

The Restoration of Ancient Bronzes

An Abstract of the Booklet Describing the Work Done for the Metropolitan Museum of Art, New York, N. Y.

By DR. COLIN G. FINK and C. H. ELDRIDGE, Columbia University, New York

In an editorial in the May issue of THE METAL INDUSTRY a process was discussed, describing the restoration of ancient bronzes as worked out by Dr. C. G. Fink of Columbia University. Since that time the Metropolitan Museum of Art, for which this work was done, has published a booklet written by Dr. Fink and C. H. Eldridge, of which the following is a brief summary.

There were two purposes in undertaking the investigation.

1. The development of improved and more general method of restoration.
2. The best means of combating the "bronze disease".

The bronze disease is caused by the presence of a trace of chloride and the action is primarily electrolytic. Sometimes a mere speck of lamp black or coal soot will become the center of a corroded area. Only a minute amount of chloride is needed to convert a large mass of copper into the mineral malachite or azurite in the presence of carbon monoxide and carbonic acid as is found in the air.

The process of corrosion of bronzes causes the green, blue, brown and red layers of the outer shell or crust covering the bronze. It was found that these layers consisted of various copper compounds or minerals, such as carbonate, chloride, oxide, oxy-chloride and occasionally sulphate and sulphide, tin and lead minerals (impurities), also oxide. Silver if present is almost always metallic and gold is almost never attacked. The chief corroding agents are the chlorides and nitrates. In moist soil the pure hard green crusts consist of oxy-chloride and oxy-carbonates of copper mixed with tin oxide; under this green crust is a layer of copper oxide, and under this is likely to be a core of metal. Where the corrosion has gone all the way through the specimen, no metallic bronze remains but simply a crust of copper compounds, usually green, covering a soft brittle core of copper oxide, red or brown.

It was decided that because of the fact that corrosion is an electrolytic process, the line of attack should be to reverse this process to reduce the metal compounds back to metal.

RESULTS OF THE INVESTIGATION

An electrolytic method was finally developed of very general application, which could be used with absolute safety. In the restoration of bronzes, in some cases, when the objects worked upon were completely mineralized, that is altogether non-metallic in character, this method succeeded in recovering most of the detail and revealing the inscription put on by the artist. The hard top crust was eliminated or reduced and the detail underneath uncovered.

THE METHOD IN DETAIL

Without any preliminary cleaning, the bronze object to be treated is hung as cathode into the 2 per cent caustic soda solution and a low amperage direct current is applied. The object is suspended with soft copper wires and is completely immersed into the solution. In case the object is very soft and fragile or is completely mineralized, fine annealed copper wire is wrapped around the object, one to turns per inch, and electrical connections are made with several turns of this wire. Where there is danger that the object might not hold together upon the removal of the hard supporting shell, it was found advisable to pack the whole object in clean white sand, after making electrical connections, and then filling the containers with the caustic soda solution.

The anodes are hung on either side of the object. Iron, duriron, and platinum anodes have been used with success. A rectangular glass battery jar of one litre capacity serves well as a container for the treatment of small bronzes. For large objects stoneware tanks have been used and there is no objection to the use of large tanks made of heavy sheet iron welded at the joints.

For a small object of about two to ten square inches of exposed surface, the cell is connected in series with a rheostat and the 110 volts direct current circuit, so as to send from 0.1 to 0.5 amperes through the circuit. A slight gassing at the anode will occur. Sometimes the crust resistance at the point of contact of the copper wire is so high that an appreciable current will not pass through the cell at first. Rather than file a clean contact, which is hardly ever to be recommended, it is best to start the cell at night, allow the solution to slowly penetrate the crust and usually by the next morning, the 110 volts potential will be sufficient to have broken through the submerged crust without injury to the surface. Often wetting the copper wire contact with electrolyte will break down the dry resistance of the crust at that point. The object being treated is always made cathode.

The action of the electrolysis is to evolve hydrogen at the cathode and to so reduce the crust to finely divided or spongy copper. This is effectively accomplished in the caustic soda solution. Very low current densities are preferred.

The reduction of a thin crust 1/16 to 1/8 inch thick usually requires three or four days. In the case of clayey crusts it is a good plan to change the electrolyte once every twenty-four hours. The use of too strong an electrolyte, or too high a current density will cause excessive gassing at the cathode (the object being treated) and may give rise to warping and falling apart of the object unless it is underlaid by a strong metal core.

Complete reduction is indicated by a free evolution of gas at the cathode with comparatively low current values. The object is then removed from the solution and carefully washed by soaking or steeping in several changes of warm water. This will remove all but traces of caustic soda.

A stage is now reached in the process where judgment must be used to modify subsequent treatment to fit the general appearance and physical strength of the specimen. If the object treated originally had a hard metal surface under a thin sandy layer of crust, the reduced copper film or layer may be removed by a gentle brushing with a stiff bristle brush or soft brass-wire brush.

If, however, examination preliminary to electrolytic treatment indicates that no true metallic core is present, it is not safe to subject the treated surfaces to pressure or friction of any kind. In this case a weak acid dip may be necessary and is used as follows:

After thorough washing to remove all but traces of caustic soda, carefully dip the reduced object into dilute nitric acid (one part acid to four parts of water). There will result a rapid action and evolution of gases, as the

reduced outer layer of copper dissolves. By alternately dipping into warm water and into dilute acid, the extent of the treatment can be controlled. As the reduced copper dissolves away, the hard, brownish-colored copper oxide surface which preserves the detail of design can be brought into view. This oxide layer does not dissolve readily in the weak acid used, but takes on a grayish tint (due probably to intermixed tin compounds). Inspection with a magnifying glass will show when the treatment has proceeded far enough. The oxide surfaces now exposed are almost as smooth to the touch as metallic surfaces and they will take on a greenish tint or patina when dipped into dilute ammonium acetate and dried in an oven at 40° to 60° Centigrade (104° to 140° F.)

Sometimes, especially if the original surface shows cracks in the patina or conspicuously high lumps or "boils" of crust, the underlying oxide layer would be found pitted and roughened in spots if the weak acid dip had been used. Such regions have been highly corroded by localized action and the treatment in the electrolytic bath causes brown copper to fill the pits. Therefore, in these cases the weak acid dip is omitted.

PREVENTION OF BRONZE DISEASE

To prevent bronze disease, the following procedure is recommended. Clean the affected parts thoroughly by the electrolytic method described above, using the 2 per cent sodium hydrate solution. Then wash and dry carefully, and apply a mat lacquer (cellulose acetate). This lacquer should be renewed every four years.

PATINATING RESTORED BRONZE SURFACES

Upon treating many of the bronzes by the electrolytic reduction methods a smooth metallic or metallic-like surface is exposed. This surface can be much improved in appearance by developing over the surface a patina very similar to that met in nature. It was felt that if they reproduced the natural patinating conditions in the laboratory and intensified these, they ought to obtain effects very similar to those obtained after years of exposure. Accordingly, the investigators subjected bronzes to the attack of various gases such as ammonia, carbon dioxide, sulphuretted hydrogen and acetic acid. This investigation is still in progress but the best results up to date have been obtained by exposing the bronze object to a simultaneous attack of ammonia and acetic acid gas. Beautiful bluish-green patinas are obtained which lose the bluish tint upon heating the bronze in an oven at about 110° C., bringing about a gradual change. They do not favor the use of any chloride, as chlorine is considered one of the chief destructive agents of bronzes and the cause of much of the so-called bronze disease.

The procedure recommended is to place the object in an air-tight cell or box at the bottom of which are two small vessels or jars, one filled with concentrated ammonia solution and the other with strong acetic acid. It is not necessary to heat the chamber. The time required for a satisfactory patina is from ten to thirty hours, although even longer treatment will be found necessary in individual cases. To render this artificial patina proof against weather conditions such as exist in New York, the surface must be protected with a mat lacquer or with a solution of beeswax. It is important to note that a long exposure of the bronze surface to a weak corroding atmosphere will bring about more artistic and lasting effects than a short exposure to strong reagents. Therefore, do not heat the reagents or the cabinet itself during the gas treatment.

EXAMINATION OF BRONZES TO ESTABLISH GENUINENESS

In order to discover if the bronzes under examination were genuine antiques, the investigation was carried on in three steps.

1. Microscopical examination of the patina or crust.
2. Metallographic examination of the metal core.
3. Chemical analysis of the metal.

In the examination of the patina may be found distinct crystalline growths of malachite or azurite, the tiny crystals partially imbedded in the underlying oxide film. Such crystalline growths are most difficult to imitate and patinas of recent origin are almost always amorphous or non-crystalline. Nevertheless, the patina may be recently formed or applied and yet the bronze may be genuine—in fact, very many of the genuine bronzes exhibited nowadays have patinas of recent or artificial formation.

Accordingly, if the microstructure of the malachite or azurite particles in the crust or in the patina is distinctly crystalline and interlaced with the copper oxide layer, the bronze is very likely to be genuine. But an amorphous malachite deposit does not necessarily imply that the underlying bronze is not genuine.

Under the outermost coating of malachite or azurite or clayey material there usually is found, in the case of genuine bronzes, a layer of copper oxide, reddish-brown to reddish-black in color.

In the metallographic examination of the bronze is found additional proof as to whether or not the bronze is genuine. Taking a very fine slice of metal from some inconspicuous part of the bronze, and preparing this by polishing and etching for microscopical examination, it is noted in the case of a genuine bronze that there is a gradual change in structure in passing to the outer exposed edge of the bronze; furthermore it is sometimes noted that changes in the size of certain crystal components of the bronze, changes that are brought about by a very slow process of "annealing."

Chemical analysis must be carried out with great care. One can support the findings of metallographic investigation by determining chemically that the main body or interior of the bronze has a decidedly different composition from the layers under the outer oxide or patina surface.

Statuary Bronze

Q.—1. What is the best statuary bronze alloy for use in a sea coast atmosphere?

2. What are the faults of the present bronzes?

3. What improvements would be desirable?

A.—There is no standard formula for this type of bronze, and many different compositions may be used. They usually contain from 80 to 90 per cent copper, and the balance zinc, with small percentages of tin, or tin and lead. One composition which appears to hold up well under atmospheric conditions consists of 80 per cent copper, 3 per cent tin, 16 per cent zinc, and 1 per cent lead.

Manganese bronze is extremely resistant to corrosion and might serve your purpose.

The Bureau of Standards has in progress at the present time an investigation of the atmospheric corrosion of various art bronzes. Reports will be issued when this investigation is completed and ready for publication.—H. S. R.

The Manufacture and Use of Solder Wire

The Possibilities of Solder Wire in Jewelry Manufacture

Written for the Metal Industry by H. M. HORLDT and W. G. BIHLER, The Horby Engineering Company, Hartford, Conn.

Wrong conceptions of the meaning of "Solder Wire" are frequently encountered. For this as well as other reasons, solder wire has been limited in its application, up to the present time, to the production of jewelry goods and a few other related industries. By solder wire, a material is commonly understood to be like a tin rod which has no other quality than that of a connecting element which binds two parts together. However, the term "solder wire," should really designate an article from which various objects may be produced.

So, for example, the material of which watch chains are manufactured consists on the one hand of a solder alloy, which serves only the purpose of a solder, and on the other hand, of another metal by means of which various objects are produced, such as pinchbeck, German silver, silver, brass, gold, etc. Solder alloy is accordingly embedded in pinchbeck metal, silver, gold, etc. Such alloys are called solder wire. It is moreover, an alloy which at the same time contains the solder required for the process of soldering. It would be possible likewise to produce rod shaped material with various cross sections, if a profitable range of application could be found for it. There are possibly such opportunities in the electrical industry, which may result in an increased use of solder wire under certain conditions, which considerably reduce the price of various objects in this line.

MANUFACTURE OF SOLDER WIRE

One method of the manufacture of solder wire has maintained itself in special favor. This is the method of embedding a solder core in the middle of the cross section of the wire. The first process is the casting of the outer metal shell. For this purpose a cast iron mold in two parts is employed (see Figs. 1, 1-1, 1-11) in which a metal shell about 12 to 16 inches long and 1¼ inches diameter is cast. In order to obtain the free space required for the solder metal, in the middle of this metal shell, a guide A is inserted in one half of the double mold. Opposite it, that is, beneath the mold, a guide bushing B inserts the core in position. A clamp D holds together both halves of the mold E during the casting. According to the length of the shell to be cast, the mold must be provided with two or even three such clamps, in order to prevent its displacement. In any case, quick disconnection of these clamps must be made possible. The core C is inserted in the mold during the casting of the outer shell and is withdrawn from the mold and the cast shell as soon as the cast metal has become rigid, in order that the contracting shell may not too tightly grip the core. At the junction of the split opening air holes are arranged leading diagonally to the surface which permit the escape of the air when the metal is cast into the mold, in order to provide the utmost homogeneity of the material cast. The mold is funnel shaped at its top to permit convenient insertion of the metal by means of the ladle.

As soon as the metal shell (see Fig. 2) is cast in the manner described above by means of the mold shown in Fig. 1, and freed from his mold, the cavity X is filled with solder material, which is also designated as "solder core." The alloy used for this solder material must be carefully calculated in order to secure good soldering and in order to comply, in the case of silver or gold alloys, with the stamping regulations.

As Fig. 3 shows, the solder core Z is cast in the metal shell and prepared for the further process of manufacture. The rod in Fig. 3 is now rolled in a profile roller to a diameter of about ⅜" and, after this operation, is drawn successively through smaller and smaller drawing dies by a drawing machine, until the desired dimensions are obtained. The smallest thickness of wire hitherto obtained is 0.007 inch. In the case of such small dimensions the important disadvantage is involved that the solder material is no longer evenly distributed throughout the length of the metal shell. By the elongation process, the solder core becomes thin and produces weak spots in later solderings, or perhaps does not solder at all.

Even in the case of thicker wires the disadvantage just described sometimes appears. Great difficulties have been encountered in the attempt to overcome this, until at last good combinations of solder material were discovered which could be drawn more easily and evenly and was more fluid in the process of soldering. Such compositions have great practical value and can be determined exactly in given cases only by reference to the alloy of the outer shell which contains the solder material.

In the above mentioned attempts, it has also been discovered that solder wires in which the core runs parallel to the long axis of the wire, show defects in soldering. In the case of a chain link, for example, the solder flowing from two sides into the solder seam drives apart the tips of the links because the cores, after the completion of a chain link, lie directly opposite one another and cause expansion. In consequence, the solder bridge is large and weakens the seam to such an extent that in spite of the good alloy of the solder core, it is not possible to twist a cable link into a curb link.

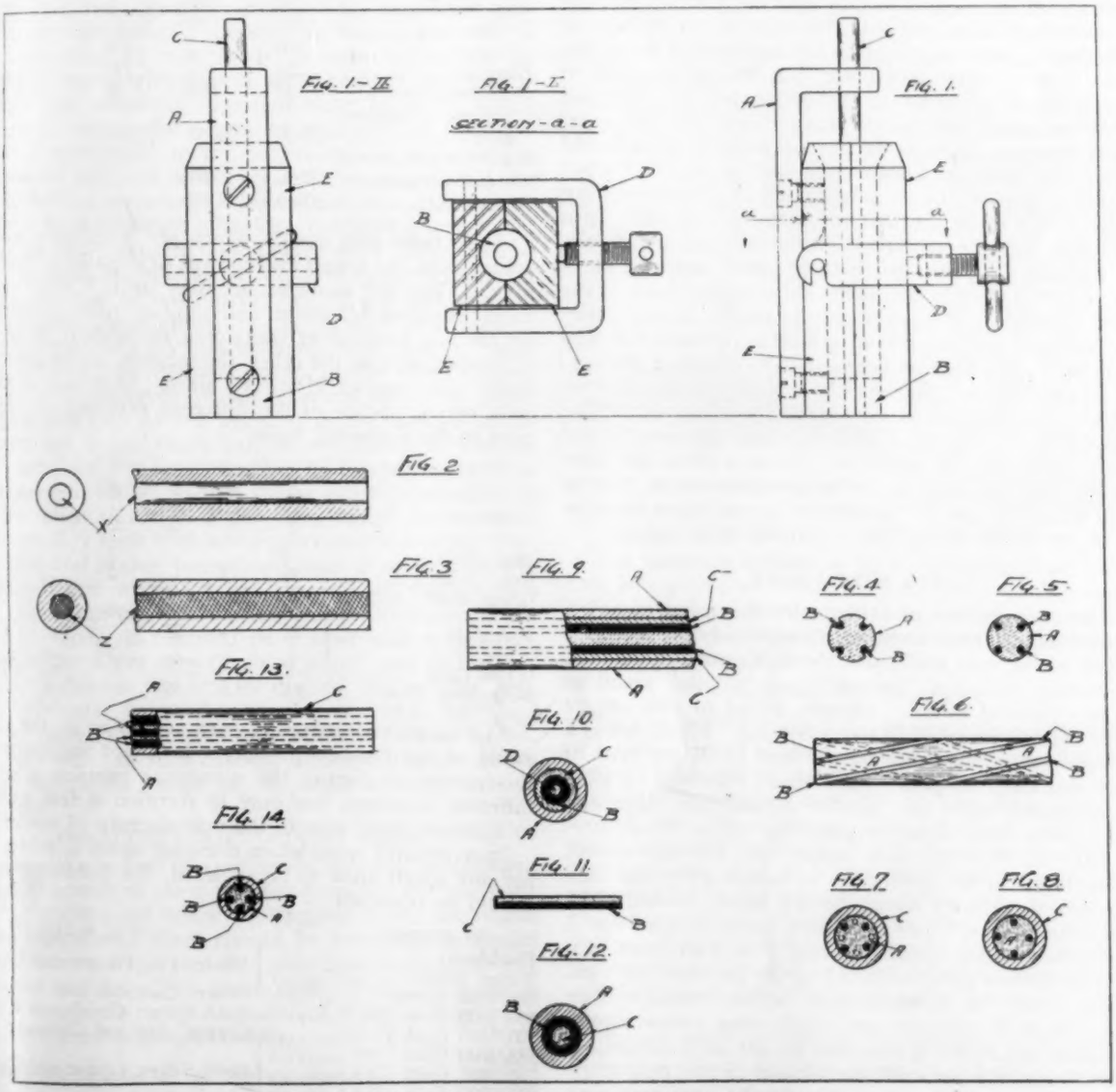
The strength of a solder seam is inversely proportional to the thickness of the layer of solder in the seam, and for that reason, to increase its strength, solder wire was passed through a series of stages, which, although they did not produce all the desired advantages, are very interesting. In Figs. 4-8 such an attempt is represented. An attempt was made to obtain a thin solder layer between the soldered seams. Fig. 4 shows the core piece A which is provided with 4 grooves in which the solder material B is embedded. After this core piece with its soldered strips has been drawn through a drawing die, it is given the changed form of the grooves shown in Fig. 5, these grooves having already been closed by the drawing process. The core is now twisted so that the solder strips are located spirally within it (see Fig. 6.). As a result the four solder strips no longer lie exactly opposite one another after the bending of a piece of wire into the shape of a link, but they are displaced in relation to one another as shown in Figs. 7 and 8. The dash-dot circles in Fig. 7 indicate the position of the solder strips of Fig. 8 are projected in the manner shown in Fig. 7 after the bending together of a severed piece of wire. Figs. 7 and 8 also show the shell C which is laid about the core A after the latter has been twisted. Owing to the fact that the shell is not twisted, all difficulties in the further processes are avoided.

Another method in the manufacture of solder wire is shown in Figs. 9-12. Here the solder is employed, not separately, but with a carrier metal C with which it is welded in taut condition. When the carrier metal, to-

gether with the welded solder, is bent into the ring shape of the desired thickness after the rolling process (see Figs. 10-12), a ring of solder B is produced by means of which a considerable quantity of continuous metal is obtained outside the middle axis of the cross section of the wire, so that the soldering at the solder seams does not occur at separate points, but in the shape of a closed ring. In Fig. 12 the same principle is shown in different applications. Here the solder metal B and C is rolled into a core wire in such a manner that no cavity is produced but the carrier metal C lies on the inside while the solder insert envelops it. The outer shell A is, as already described, cast by means of the mold shown in Fig. 1, then rolled and drawn after the insertion of the cores and the solder rings.

In this process certain difficulties are encountered in practice, namely, that the desired proper uniform combination of the solder with the carrier metal is interrupted by oxidation during the welding. Moreover, the solder becomes united, during the process of welding upon the carrier metal, with considerable quantities of the latter and thus the composition of the solder is changed. In the same way unequal melting points result. An effort has been made to overcome this disadvantage by employing, as the first element of the solder carrier, a round or otherwise shaped metal rod which has more tensile strength than the shell material and much more tensile strength than solder. This metal rod is placed in a forced draft furnace, free of oxide, as a temperature higher than the melting temperature of the solder. Thereupon the heated metal rod is similarly arranged in a mold, and after removal of the oxide layer which has in the meantime been produced on the outside of the rod, the solder is cast by the use of hydrogen or other reducing gases about the heated rod as protectives against oxidation. The metal rod thus produced is then converted into solder wire in the manner already described by rolling and drawing.

A further attempt to improve solder wire which has been carried out, in part successfully, consists of the introduction of borax fluxing material into the solder. Pulverized solder and the glowing borax are mixed together, poured into the drawing block and stamped solid, whereupon the block is drawn in the manner described. Up to this point, however, there are still many difficulties to be overcome in the process, the chief one being that the fluxing material becomes fragile during the drawing process, especially in the case of thin wire, and is distributed irregularly along its length. The advantage of this solder wire with its melted fluxing material, however, would be considerable, since the elaborate purifying



DETAILS SHOWING METHODS OF MAKING SOLDER WIRE

process required, for example, in the case of chains or ring mesh, is no longer necessary, and the machine product can be soldered directly from the machine.

Still more recently, metals have been used in place of borax for the purpose of deoxidation, which remove, at temperatures of 200°-800°C., the oxides and slags formed in the soldering process. Phosphor copper and sodium may be mentioned as such metals. Sodium, a soft, plastic metal may be introduced either in plastic or in liquid condition, into a tube made of the solder to be used and protected by a second tube of hard metal. Sodium is a strong reducer, becoming oxidized itself in the process. The product of its oxidation, has in turn the quality of dissolving many metal oxides. Metallic sodium imparts a polish to the cut surfaces of the ring shaped pieces of wire, and the oxide, resulting from the process at the same time dissolving any metal oxides that may be produced, whereby a double purification is effected.

In Figs. 13 and 14 yet another process of the manufacture of solder wire is shown. Fig. 13 represents a partial section and Fig. 14 a cross section. A represents the core wire employed as a solder carrier. It contains several retaining incisions in which the wire strips may be inserted. C represents the metal shell. By this arrangement it is intended to prevent the escape of the solder at the seams, and thereby effect soldering together of finished products, without the necessity of employing antisoldering material. By this arrangement of the solder strips, surplus solder is avoided, but the temperature in the process of soldering must nevertheless be restricted so that the solder may not eventually flow out of the wire. If this happens, there is danger of imperfectly soldered seams. The melting of the metals used for the shell must be done so that the material which has the biggest melting temperature will be the first to enter the crucible. In a given case, first copper, then brass, and last of all, tin. The melting slags formed in the process must be carefully removed in order to obtain a thorough fusion of the melted elements. Whenever certain metals do not easily unite with one another, it is of special importance not only to employ a flux such as borax, but to maintain the correct temperature of the already melted metal. If, for example, it is desired to mix copper with cadmium, the copper when heated much above its melting point would at once volatilize the cadmium. In such cases the temperature must be kept as low as possible and in case of special difficulty, special "hardeners" or mixtures must be used so far as the desired alloy permits other metals.

SOLDER WIRE ALLOYS

In the manufacture of solder wire the following have been the metals most commonly employed for the composition of the cast shell: pinchbeck, German silver, tin, and recently so-called "platinin" and "goldin" metal as well as gold and silver. Various alloys of this nature may be briefly described in the following. Pinchbeck is a low brass containing from 80 per cent to 94 per cent of copper and the rest zinc. Varieties of this type of alloy most commonly used are Similor, Oreide and Manheim gold. Alloys more closely resembling yellow brass, running from 60 to 75 per cent copper, are, to some extent, also employed in the production of solder wire, and bear the names of Prince's metal, Bristol brass, Mosaic gold, Naval brass (with 1 per cent tin), potin, yellow metal, etc. Sterling metal, Japanese brass (Sin Chu) and Mosaic gold contain only from 33 to 35 per cent of zinc. Another variety is imitation gold, which contains from 18 per cent to 25 per cent zinc. Still other yellow copper alloys used are nickel brass with 54 per cent copper, 44 per cent zinc, 1.5 per cent nickel and .5 per cent iron; silicon brass with 69.5 per cent copper, 28.5 per cent zinc, 1 per cent tin and .85 per cent silicon; Raiser brass with 20 per cent zinc and 20 per cent aluminum.

German silver alloys (nickel silver) consist of about 45 to 63 per cent copper, 6 to 35 per cent nickel, and 18 to 36 per cent zinc. Cheap alloys have a considerably smaller amount of nickel, this reduction in quantity sometimes partially made up for by a little manganese.

German silver is whitish or yellow according to its compositions and harder than pinchbeck. It is less affected by acids than pinchbeck or brass and is capable of receiving a high polish. Platinin and goldin metal have the quality of taking a still higher polish. For the melting of nickel silver alloy the metal is crushed to proper size and carefully mixed in the crucible, in such a way that the lower and upper layers consist of copper and so that the whole can be covered with pulverized charcoal, and melted in this manner.

Silver alloys for 28 solder wire must meet the stamping regulations. For the protection of the public as well as for the prevention of counterfeits, stamping was employed at an early period but unfortunately not everywhere by uniform regulations.

Silver can be alloyed with almost all metals and there are innumerable silver alloys for solder wire.

	SILVER	COPPER	GOLD	NICKEL	ZINC
Coin Metal	900	100	....	....	....
Sterling	925	75	....	....	....
Electrum	200	....	800	....	....
Electrum	250	....	750	....	....
Nurenberg Gold	55	890	55	....	....
Shibuiche (Japanese alloy)	30–50	70–50	....	....	....
3/3 Silver (Mousset's Argent-tiersargent)	27.50	59.50	....	3.50	9.50
Argent Ruolz	20–40	35–50	....	25–30	....

Aside from coin metals, which are frequently used for solder wire, the names and content of the alloys frequently vary. Thus for example, an alloy of 1/3 silver and ⅔ nickel is called 3/3 silver, and similarly Billon designates, on the one hand silver containing more than 50 per cent of copper, and on the other, the mixture above mentioned under the name of Mousset's alloy. This is also true of gold alloys. Some of the different varieties of gold appear in the following table.

COLOR	GOLD	SILVER	COPPER	IRON	CADMIUM	NICKEL	ZINC
Blue Gold	3	..	..	1	..	..	..
Gray Gold	30	3	..	2	..	..	..
Green Gold	75	11-25	0-9.7	..	4.3	..	..
Red Gold	10	1	4	..	..	..	..
	75	..	25	..	..	..	..
	1	2	..	..	..	..	..
White Gold	75-85	..	..	..	..	8-10	2-9
Nurenberg Gold ..	5.5	5.5	89	..	..	..	..

The alloys may naturally vary according to the desired value of the finished product. It is not the purpose of this article to discuss the numerous possible alloys for different purposes, but only to mention a few examples to illustrate their uses in the manufacture of solder wire.

In a general way, when deciding upon a solder alloy for any given alloy to be soldered, the following outline should be observed.

TO SOLDER	USE ALLOY OF
Pinchbeck	Silver, Tin, Copper and Zinc
Nickel Silver	
800/1000 Silver	Silver, Cadmium and Brass
333/1000 Gold (8K)	Gold, Silver, Copper and Cadmium
500/1000 Gold (12K)	Copper, Zinc and Cadmium
585/1000 Gold (14K)	Gold, Silver, Copper and Cadmium
750/1000 Gold (18K)	
833/1000 Gold (20K)	

Tests for Molding Sand

A Resume of the Tentatively Adopted Methods of Tests Developed by the Joint Committee on Molding Sand Research of the American Foundrymen's Association. Part 2.*

PERMEABILITY TEST

The term "permeability" as used in this test, is that physical property of sand which permits the passage of gases. It is upon this property of permeability that the venting qualities of sand molds and cores depend. A sand of high permeability has good venting quality because of its "openness." The natural characteristics of the sand and its binders, the density with which these are packed, and the percentage of moisture used for tempering, are important factors in regulating the degree of permeability. The physical property of the sand called permeability is ascertained by measuring the rate of flow of air through a standard specimen of sand under a given pressure.

TEMPERING OF SAND

In testing sand for permeability it is absolutely necessary that the sand be properly sampled and uniformly tempered. For plant check or control tests upon facing or heap sands in daily use, one may test the sand as tempered for molding.

Since it is the object to determine the maximum permeability under suitable foundry working conditions, in the examination of new sands experiments should invariably be made with several water contents in order to ascertain that amount ("optimum water content") which develops the maximum degree of permeability. It is advisable in most cases to try percentages of water beginning with 4 per cent and increasing by stages of 2 per cent, up to and including at least 8 per cent. Sometimes it will be found difficult to make a test with a water content of an exact predetermined percentage. The permissible extent of deviation from the predetermined amount should in no case be more than one-half per cent, and can be intelligently determined by the careful experimenter who observes critically the tendency of a sand to show widely differing permeability values as the water content is appreciably changed. A deviation not exceeding .2 per cent (5.8 per cent or 6.2 per cent in the case of an attempt to get 6 per cent) can be considered as entirely satisfactory for the determination of the permeability at the nearest fixed percentage. The exact percentage of moisture, even if within 2 per cent, should be reported. Supplementary tests with lower percentages of water than 4 per cent and higher percentages than 8 per cent should be made if and when the facts ascertained justify such tests. For example, when cohesiveness value considered proper to report is obtained on a sand with a moisture content below 4 per cent or above 8 per cent and a permeability value on the sand is desired, the test for permeability should be conducted with the sand tempered with the same amount of water as in the case of the cohesiveness test. In such cases, a sufficiently large sample of sand should be tempered, to permit making both of these tests.

PROCEDURE FOR EXAMINING SANDS

In the examination of new sands, proceed as follows: Dry 1,000 grams of sand, selected properly, for one hour at a temperature not below 105 degrees Cent., nor above 110 degrees Cent. Care should be exercised to spread the sand over a large area in a thin layer in order to expel all the moisture in a given time. This will make it possible to add the proper amount of water and give the sand the desired moisture content.

After the sand has cooled, measure out the desired quantity of water, adding sufficient extra water (usually from one-fourth to one per cent) to allow for evaporation during mixing. Thus if it is desired to add 4 per cent water and one-half per cent extra water is needed, one would add 47 cubic centimeters (since one cubic centimeter of water weighs 1 gram) to 1,000 grams, and secure a total weight of 1,047 grams.[1]

For the tempering operation, spread the sand on a smooth flat or dry surface in a layer about 1 inch thick, sprinkle a small quantity of the required water evenly over the sand, and work the latter gradually. Again spread it into a thin layer and repeat the above operations, adding more water. Continue to do this until all of the water has been thoroughly distributed through the sand. There should be no dry lumps or other evidence of uneven tempering.

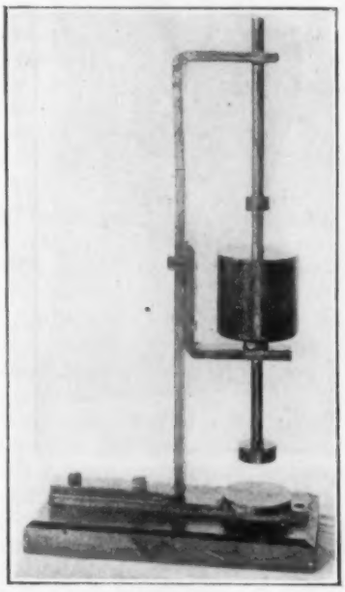


FIG. 1. RAMMING APPARATUS

The sand should now be allowed to stand in order that the maximum temper may be developed. To secure this temper place the sand in a humidor or air-tight receptacle, and allow it to stand for 24 hours. After this, the sample is ready to be tested, as below.

Take the entire sample of sand from the humidor. Pass this entire sample twice through a coarse riddle and return the sand as quickly as possible to the humidor or receptacle. From this take sample to be tested for permeability; also sample to be tested for moisture content, and for cohesiveness if desired.

ASCERTAINING MOISTURE CONTENT

The moisture content is to be determined as follows: Dry 100 grams of tempered sand for one hour between 105 degrees and 110 degrees Cent. When dry, re-weigh. The loss of weight in grams is the moisture content expressed as percentage.

RAMMING OF SPECIMEN

Take a sufficient quantity (from 150 to 200 grams) of tempered sand to make a column 2 inches (5.08 centimeters) high, with a tolerance of 4 per cent. The sand should be carefully placed in the container and gently leveled off. Place pedestal and container with sand in position beneath rammer. Gently lower rammer-rod head into container until it is supported by the sand. Raise rammer-head to the upper stop, and let fall. Repeat twice, making a total of 3 rams. Note whether the upper end of the rod is within the tolerance marks. If not, discard the sample and put in another lot of tempered sand of sufficient quantity to yield a column of the required height.

* Part 1 was published in THE METAL INDUSTRY for March, 1925.

[1] Moisture content for all molding sand determinations and tests is to be expressed as the percentage of moisture in the damp sample of sand. It is not proper to calculate the amount of moisture, proportionate to the weight only of the dry sand.

This is usually accomplished on the second trial. Lift rammer-rod until disc at lower end of rod is free from the sand container, and take container off of pedestal.

MEASUREMENT OF AIR FLOW

Fill tank A (see Fig. 2) with water to within 4¾ inches (12.2 centimeters) of the top. Before attaching sand

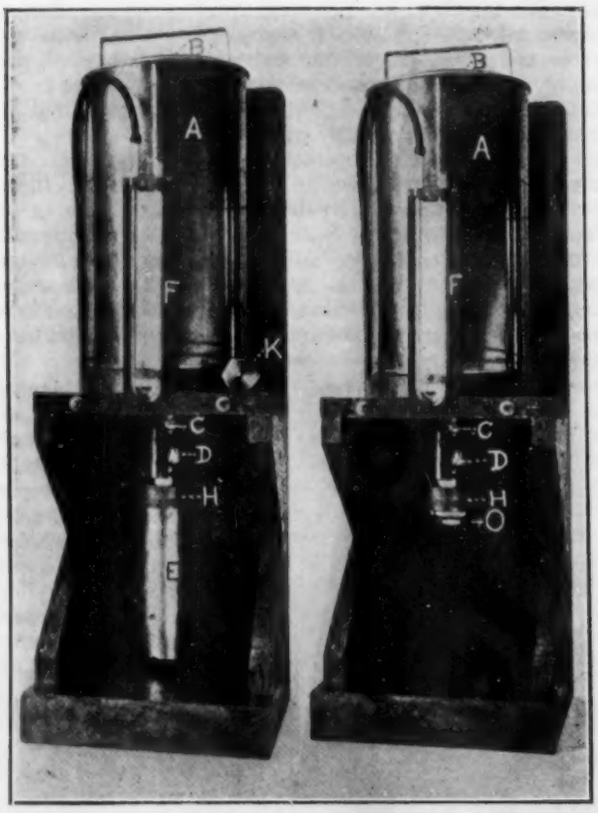


FIG. 2. PERMEABILITY TESTING APPARATUS

container with specimen, open valve D, and raise bell B until mark "X" appears. Then close valve D. Attach sand container to rubber stopper H, moistening sides of stopper before applying, to prevent air leakage. Open valve D. Note scale on side of bell B, and as cup sinks, and zero mark on scale passes edge of tank A, start stop-watch. Read pressure in manometer tube as soon as the pressure reading becomes steady. The instant the "2,000" mark on bell B reaches upper edge of tank A, the stop-watch should be stopped and time recorded. This represents the time required to force 2,000 cubic centimeters of air through the sand. The time and pressure obtained as above, are to be used as described below.

[2] The plugs through which the orifices are drilled are so small that it is not a serious item of expense to make them of gold. Jewelers have furnished these gold plugs for $5.00 per pair.

CALCULATION OF PERMEABILITY

The degree of permeability as determined by this test is found by employing a formula. By its use, permeability is ascertained as the volume of air per minute, per gram per square centimeter pressure, per unit volume in specimen.

Permeability equals the number of cubic centimeters of air forced through the sand specimen, multiplied by the height of the sand specimens in centimeters; and this product divided by the product of the pressure in grams, the area of the sand specimen in square centimeters, and the time in minutes. Thus

$$\text{Permeability} = \frac{\text{cm}^3 \text{ of air} \times \text{cm height of specimen}}{\text{grams pressure} \times \text{cm}^2 \text{ area of specimen} \times \text{minutes}}$$

The method of conducting the permeability test herein described calls for 2,000 cubic centimeters of air to be forced through the specimen; 5.08 centimeters (2 inches) to be the height of the specimen; and 20.268 square centimeters (3.1416 sq. in.) to be the area of the specimen. These fixed quantities are therefore substituted as constants in an equation as follows:

$$\text{Permeability} = \frac{2{,}000 \times 5.08}{20.268 \times \text{grams pressure} \times \text{minutes}}$$

Reduced to its simplest terms this equation reads:

$$\text{Permeability} = \frac{501.2}{\text{grams pressure} \times \text{minutes}}$$

RAPID METHOD FOR USING THE PERMEABILITY APPARATUS

By making a slight change in the standard apparatus, which can be quickly readjusted for standardization purposes, greater rapidity of operation can be obtained at a slight sacrifice of accuracy.

This change consists only in inserting one of two standardized orifice-plates in the lower end a nipple at the base of the sand container E. These orifice-plates must be lined with some material which does not corrode or wear rapidly. Hard gold is recommended for this purpose.[2]

The orifice plate which is adapted to the sand container is to be screwed into its place in the nipple. The sand container with the sample of rammed sand is placed in position. Turn three-way valve to "vent" and raise bell B. Turn valve to "On" and allow bell B to sink. Read pressure on manometer F, and close valve.

To test additional samples, proceed by placing them in position in the machine, turning valve to "On" each time long enough to get a reading on the manometer. Bell B need not be raised again until it has sunk to rest on the bottom of the tank.

Knowing the pressure obtained as above the permeability of the sand can be obtained from a table.[3]

[3] For a complete description of the orifices and the table mentioned see the booklet Tentatively Adopted Methods of Tests and Resumé of Activities of the Joint Committee on Molding Sand Research, issued by the American Foundrymen's Association.

Centrifugal Casting Calculations

In the article on Centrifugal Casting Calculations by R. F. Wood in our May issue, on page 186 a formula was incorrectly printed by a typographical error. The formula which read $K = {}^{wr^2}(g \times 30)^2$ should be $K = {}^{wr^2}(g \times 30^2)$

Incidentally, it will be of interest that an apparatus and method for the centrifugal casting of submarine periscope tubes and the like, invented by R. F. Wood, is covered by U. S. Patent 1,533,780 issued April 14, 1925. This process involves the use of an inclined-axis casting machine which operates according to the principles described in the above article.

Tempered Copper Phantasies

The Fallacy of Attempting to Temper Copper

Written for The Metal Industry by ADOLPH BREGMAN, Managing Editor.

"Dear Sir i am riting you in regard too mi invention whitch is the hardening of copper too anny degree of hardness. i have it through the pattent office now and will have some of the products on the market By the first of the year and as i am a verry poore man and unlearned as you may see would bee glad to have your advice as too how too handle it too get the best results out of it."

This is not an isolated case or a freak. It is an example, typical of thousands of others. Nor is the lure confined to the illiterate. Like the old mirages from the Philosopher's Stone to Perpetual Motion it picks its victims from all classes—all asking the same question.

How to temper copper?

The legend is that Tubal Cain knew and the secret died with him. Ever since then men have been striving to find out. Every so often somebody has broadcasted the claim that he had found it. But so far it is still unfound.

Copper has always been attractive because of its beauty and its peculiar and interesting properties. Due to the fact that iron and steel were unknown at one time, whereas copper was comparatively plentiful, it was used for implements of warfare and protection. This of course, lends it added glamor and is probably the cause for the mistaken craving for tempered copper today. Knowing as we do that copper is soft, the old question has come up again and again. "By what means did Tubal Cain harden copper to make it useful for implements of war?" And always the same conclusion has been jumped at. "He tempered it. He tempered it probably as we are tempering steel now. How did he do it?" And hundreds or perhaps thousands of misguided near chemists and metallurgists have chased this will-o'-the-wisp, trying to find out how the Ancients tempered copper. They have failed, and the reason for their failure is very simple and short. The Ancients never tempered copper.

But visions of this sort take a strong hold on the lay mind. Copper is such a widely distributed metal, beautiful to look at and romantic in its associations. The fact is, however, that although a number of romances are connected with copper, its uses are strictly prosaic and practical. It is an indispensable material in modern life, but its indispensability is based on some very hard-headed considerations. In the first place it will transmit electric current as no other metal can, at the same cost—hence half the world's copper production goes into the electrical industries, for such things as transmission wire and high conductivity castings. It serves to excellent advantage in alloyed form, such as brasses and bronzes, but its use is dictated by the fact that it is not only suitable, but comparatively cheap. If something were to happen that threw its price out of line with other materials, it would undoubtedly be replaced. During the war, copper rose to a point where ordinary industrial appliances could no longer afford to use it, and therefore other metals were sought. When the war was over, copper found that aluminum had taken its place in many fields, that copper and brass plated articles had usurped its privileges, using as a base the always cheap iron. And since then the copper producers have put up a tremendous fight, organized and financed co-operatively, to recover a place in the sun. A part of this place they will never get back, for it has been permanently dispossessed by aluminum.

COPPER OF THE ANCIENTS

Perhaps a short sketch of the background of copper will explain the strange desire for the rediscovery of an art which never existed. According to the best authorities, it seems that the discovery of metals originated in the Neolithic Age, with domestic fires which accidentally reduced the metals in the ground directly under the fires, thus exposing them to view. Copper was probably the first metal so discovered and used by man. Fragments of prehistoric hatchets, spear-heads, knives and other implements that have been unearthed are made of either copper or an alloy of copper and tin (which is called "true bronze") and a number of impurities which are today eliminated by modern methods of refining.

Chemical analysis has shown that the early bronzes consisted of 80 per cent or more of copper, and up to 18 per cent tin, the remainder being made up of elements now considered impurities, such as antimony, nickel arsenic, lead, silver, iron, sulphur, etc. The mere presence of these impurities, to say nothing of the tin, would add appreciably to the hardness of the metal.

The copper instruments had not been tempered. They had been hardened by hammering or through the presence of impurities. Those made of bronze were naturally hard, due to the presence of tin. Both of these materials have been erroneously called tempered copper.

Professor Gowland of the Royal School of Mines in England in an address before the British Institute of Metals, as far back as 1912, spoke as follows: "The castings (knives, swords, etc.) generally were hammered at their cutting edges and it is this hammering, and to it only, that the increased hardness of the cutting edges of both copper and bronze weapons is due, and not to any method of tempering. Much has been written about the so-called art of tempering bronze supposed to have been practiced by men of the Bronze Age in the manufacture of their weapons; the hardness is also said to be greater than can be given to bronze at the present day. I should like to correct this error as it can only have arisen owing to its authors never having made any comparative practical tests of the hardness of bronze. Had they done so, they would have found that the ordinary bronze of today may be made as hard as any; in fact harder than most of prehistoric times by simply hammering alone."

Although present day methods of extracting copper from its ores and refining it to a high purity are very complex and require enormous expenditures for equipment, it can be obtained, in a very impure form, by absurdly simple means. An ordinary camp fire if large enough would reduce copper from its ores, if it happened to be built over a shallow cavity which would act as a hearth for the fire, and a crucible for the molten metal. If the cavity were deepened by surrounding it with a wall, it would resemble the forerunner of the earliest type of smelting furnace, which was used in England up to the 17th century.

The alloys of the early metal age were not made synthetically or by direct intention. The metallurgist of those days did not take pure copper and pure tin and melt them together in order to make a bronze. He obtained his bronze by smelting ores in just such a shallow cavity as has been described, which contained both copper and tin, or perhaps he mixed the ores of

copper with the ores of tin. Anyone can do now what he did then. Dig a shallow hole in the ground about 12 inches in diameter. Lay a charcoal fire on this hearth and then spread a layer of ore upon it; then another layer of charcoal and another layer of ore and so on, through a half dozen alternate layers of ore and charcoal. Fire up this "furnace" and a sizeable cake of copper will result. A good breeze will keep the fire going nicely, but bellows will aid the operation materially. When the metal is melted, the charcoal and slag can be raked off and the cake allowed to cool until it can be handled. If it is taken out while still at a temperature a little below solidification, it can be broken up without difficulty by the aid of a large stone.

HARDENING VS. TEMPERING

To the average layman any hardening process is synonymous with tempering, but there is no greater mistake. Hardening can be accomplished in a number of different ways, but tempering is a form of heat treatment involving a sudden change in temperature, such as heating a metal to a high temperature and then cooling it suddenly by plunging it into water. The Ancients never tempered copper; they hardened copper. They hardened copper by adding tin or zinc, perhaps, or they hardened it by beating it with a hammer. This operation, which is known as "cold working" is commonly practiced today. Copper can be hardened without the slightest difficulty at the present time. It can be hardened by the addition of tin, making it a bronze; by the addition of zinc making it a brass, by the addition of nickel; by the use of all three of these metals, and other elements, such as manganese, aluminum, etc. The present-day manganese bronze (which, by the way, is misnamed, since it is really manganese brass), the modern aluminum-bronze (which is neither a bronze nor a brass, but an aluminum-copper alloy), and a host of other alloys made the hardened copper of antiquity look weak in comparison. They are all hardened coppers, but not tempered coppers.

Another method of hardening copper is to work it mechanically while cold by hammering, rolling, or drawing. The hard-drawn copper wire, and cold-drawn tubing of commerce are common examples. Trolley wire for carrying electric current for trolley cars is another common example of copper hardened by this method.

PRESENT-DAY HARDENED COPPER

In addition to the fatal misunderstanding of what can be done with copper, we are confronted by the fact that even if copper could be tempered, most of the hoped-for uses and outlets for it are non-existent. The writer has seen safety razor blades made of the so-called hardened copper. But who in the world would use them? Steel can be made harder, tougher, stronger and very much cheaper. The same applies to cutting tools in the machine shop.

Any good metallurgist today can make a cutting tool of copper either by alloying or by hammering the pure metal sufficiently. In the first case, however, his result is no longer copper, but an alloy, and in the second case his product compares in no way with steel in its properties, and is, in addition, probably much more expensive. Some of the samples of so-called hardened copper are aluminum bronze, a comparatively recent development in copper alloys, which is very hard and very tough, but certainly not new or ancient; neither the "tempered copper" of today nor legendary copper of antiquity. Aluminum bronze contains about 10 per cent aluminum and the rest copper. It may be made hard enough to cut soft steel, but for practical purposes in that field, it is nothing more than an attractive plaything. Alloy steels are much better. In other fields, such as worm gears for Ford tractors it is very useful, but it is not hardened copper; it is an alloy of aluminum and copper.

If copper of reasonable purity could be tempered—that is, hardened by heat treatment—it would however have certain fields of usefulness. It might be used for condenser tubing in marine boilers, for locomotive tubes; for equipment in chemical plants, or for copper nails, rivets, etc. In these places it might replace the present soft copper or the harder copper alloys such as Admiralty metal, Muntz metal, etc., providing it resisted chemical corrosion better, and providing also that it was not too expensive to manufacture. Hardness alone is far from enough to recommend a metal; it must have numerous other qualities to be of practical use.

TEMPERED COPPER INVENTORS

The United States Bureau of Standards in Washington is besieged with letters and samples from inventors and investors who have been beguiled by the tempered copper dream. Many of these samples contain other elements, which act as hardeners. Many have been hardened unwittingly because they have been improperly melted with the result that they are not only hard but brittle. When copper is melted it becomes very susceptible to the attack of oxygen in the air which combines with the copper to form what is known as cuprous oxide. This cuprous oxide is soluble in molten copper and impregnates the whole mass. After the metal has been poured in the form of a casting, it is found to be very much harder than pure copper, but at the same time it is very much more brittle and wholly useless for most of the purposes for which copper is valuable. Under proper melting conditions the air is not permitted to come in direct contact with the metal. The property of ductility has also to be considered since copper which has been hardened, but which at the same time has lost its ductility, loses also its value for industrial purposes. The hardness which is conferred upon copper by its content of cuprous oxide is nothing less than a detriment and a property which, far from making the material valuable, makes it useless.

A number of really pitiful cases have come to the writer's attention as a result of this dream of tempered copper. Among its victims have been all types, from blacksmiths to business men. One particularly striking case was that of an old man who had spent over forty years in trying to market his tempered copper. He was a well known character in the metropolitan district; tall, gaunt and seedy looking, with a long white beard which served only partially to hide the fact that he wore no tie, and that his shirt front was not all that conventional shirt fronts should be. He never gave anyone his formula; he never permitted anyone to mix his alloy for him, but insisted upon melting the metal himself, and adding a white powder of which he alone knew the composition. His metal was certainly hard but chemical analysis proved that it was not pure copper; it contained generous quantities of tin. His white powder, although no formula has ever come to the writer's attention, was probably one of a large number of possible fluxes or "de-oxidizers" often used to make copper alloys. From time to time he sold some of his material for bearings and managed to eke out a dreary living. He had a beautiful array of samples of cutting tools, safety razor blades and old fashioned straight razors, really attractive in appearance, and undoubtedly, sharp and hard. They were hardened but they were not tempered; they were not pure copper and they were not marketable. Steel was better and cheaper.

A blacksmith came in once, ablaze with joy and hope. He had found it. By accident in working at his forge he had found that a piece of copper which had got into

t by mistake had come out so hard that it could be used for a knife. He repeated the operation tremulously—and was successful. The world was his! But he never could lay his hands on it or collect anything from it, for the simple reason that his copper was loaded with cuprous oxide, brittle and wholly worthless. Fortunately for him, his family insisted that he stick to his forge and confine himself to iron, instead of promoting his "discovery."

Another case was that of a business man who came in asking a simple question. If he could temper copper and retain all its original qualities, adding that of hardness, would it have any commercial value? To which the answer was very obviously, "Yes." But this gentlemen was cautioned that the properties of copper were various and included such things as ductility and electrical conductivity. If he could harden copper without disturbing those properties, there would be a use for it, as for example, power transmisison wire, which, if it had greater strength would require fewer poles to support it and would therefore, be cheaper to use than the present soft copper. He was warned however, that there was not the slightest scientific evidence to show that this could be done. If he thought of using it for other purposes than electric wire, there was the problem of corrosion by liquids and chemicals to face. He was also warned that the tempered copper of antiquity was not pure copper and that it could be duplicated and improved upon in a number of ways today. This did not deter the gentleman, who had not even engaged a metallurgist to help him, and so far he has succeeded in doing nothing more than spending a considerable amount of his own money in trying to organize a company.

About two years ago newspapers throughout the country cheered the re-discovery of tempered copper and the sale of patents to the United States Steel Corporation for one million dollars in cash, and a cent a pound royalty. Probably the person named in the press honestly believed that he had discovered how to temper copper, but so far as the writer has been able to discover, he never sold it to the United States Steel Corporation, or to anyone else. Within the last few months two other men have broken into the charmed circle, and both of them are said to have made fortunes out of their discoveries. It is safe to say that their fortunes equalled those of the other discoverers of tempered copper.

To sum up briefly, the situation is this. So far there has never been any such thing as tempered copper. The Ancients did harden copper, but we can do it better than they did. If a tempering process is ever discovered it will have to be applied to an alloy of copper and other metals. This is very likely to reduce its electrical conductivity below the standard required for electrical transmission work. Other possible uses remain, but there the question will arise of the ability of the material to withstand the corrosive action of various liquids and gases. Lastly, the cost of manufacture will have to be low enough to permit it to compete with the metals and alloys in present day use.

Corrosion of Oil and Gas Equipment

Abstract of Bulletin 233, Bureau of Mines, on Protection of Oil and Gas Field Equipment Against Corrosion

The magnitude of the destruction of metal equipment in the oil and gas industries due to corrosion is proved by the huge consumption of pipe, tubing, casing, pump valves, and sucker rods to replace worn-out equipment, and by the amount of such equipment that is left in wells or junked. It is the salt water in the wells and in the strata through which the wells are drilled that is responsible for the extremely rapid corrosion in oil and gas fields. Corrosion of equipment is caused principally by electrolytic action which is analogous to the action in the well-known galvanic battery. The different strings of pipe, and the pumping equipment immersed in salt water in the oil well are in effect the electrodes in a huge galvanic battery. Different metals and different pieces of the same kind of metal, and even different points in the same piece of unhomogeneous metal, constitute the positive and negative electrodes in the galvanic couples, whereas the salt waters with their dissolved salts and gases constitue the electrolytes. Under these conditions the electropositive surface from which the current passes from the metal into the salt water is the one that suffers corrosion.

Although corrosion must be regarded as a water trouble, it is also recognized that not all ground waters are corrosive. In general, neutral saline waters, acid waters, and waters whose dissolved constituents break down or hydrolize readily to yield acids are corrosive in the same sense that they either induce corrosion or afford conditions favorable to its occurrence, whereas most strongly alkaline waters are noncorrosive. Waters that contain magnesium chlorine are especially corrosive, whereas those that contain sodium carbonate are generally noncorrosive under oil and gas well conditions. Waters that are noncorrosive in oil and gas wells may be highly corrosive when exposed to the atmosphere. The fact that noteworthy corrosion does not always occur in wells yielding corrosive waters but does sometimes occur in strongly alkaline waters, especially those charged with hydrogen sulphide gas, does not invalidate these general rules. Local conditions in the walls affect the irregular occurrence of corrosion.

Certain gases absorbed in water influence corrosion. This is especially true of carbonic acid gas and gaseous sulphur compounds, more especially hydrogen sulphide. Hydrogen sulphide absorbed in corrosive waters, or even in alkaline waters that otherwise could not be corrosive, causes especially rapid corrosion of iron and steel equipment in oil and gas wells; the end products are usually mixtures of ferrous sulphide with other ferrous compounds.

The processes of corrosion in oil and gas wells are self-stimulating, the products of corrosion forming mud-like masses which are in themselves electro-negative to iron thus setting up new galvanic couples with the iron and steel equipment. The destruction of the equipment thus becomes more and more rapid as the corrosion progresses.

Although much progress has been made in preventing the corrosion of metals, the need for reducing the damage from corrosion in oil and gas fields is still imperative. This is especially true of underground corrosion in the wells, because underground conditions favor corrosion and are difficult to study; hence they have not been thoroughly understood.

In efforts to stop damage to oil and gas field equipment by corrosion, numerous methods have been proposed or tried with varying success. Some of these methods are cheap and effective. It is surprising, however, that in many important fields the damage by corrosion is accepted as necessary or unavoidable, although cheap and effective methods have been developed and successfully tried which greatly reduce or eliminate the trouble.

The investigator has outlined the factors and conditions that influence the corrosion of both underground and surface equipment in oil and gas fields and has described methods of combating such corrosion in Bulletin 233, compies of which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

Testing Materials Society Meeting

Sessions on Metals at the Annual Meeting in Atlantic City, N. J., June 23-26, 1925

FIRST SESSION—TUESDAY, JUNE 23, 8 P. M.

Report of Committee A-5: On Corrosion of Iron and Steel. J. H. Gibboney, Chairman.

Outlined extensive investigation on field exposure tests and accelerated corrosion tests on metallic-coated articles with details concerning tests of zinc-coated sheets, wire woven and chain-link field fencing and structural shapes, hardware, line material, etc.; latest results of atmospheric exposure and total immersion tests of bare metal sheets. Submitted a revision of the tentative specifications for hot-dipped galvanized sheets and a preliminary draft of requirements for galvanized wire which are offered for study and comment.

Report of Committee B-3: On Corrosion of Non-Ferrous Metals and Alloys. E. C. Lathrop, Chairman.

Reports progress on testing of methods for total immersion, alternate immersion, spray, and accelerated electrolytic corrosion tests of nickel, zinc, lead, copper, aluminum and Admiralty metal.

Evaluation of Corrosion Tests. E. Blough.

The paper, after brief mention of the several methods commonly used to determine the effect of corrosion of metals, proposes as worthy of further investigation a method that has been used by others, namely comparing the physical properties of the metal before and after corrosion. Tests are described in which specimens of five commercial non-ferrous metals, in the form of tension test specimens, were subjected to corrosion in a salt spray and tested for tensile strength and elongation after being subjected to salt spray for various periods of time. This method has inherently the advantage of disclosing the effect of corrosion upon the residual metal which is apparently unattacked, and it is believed that the method should be a valuable adjunct to other methods for evaluating corrosion tests.

Accelerated Corrosion Tests on Bare Overhead Electrical Conductors. Frank F. Fowle.

This paper describes a laboratory method of simulating the corrosive influences of unfavorable outdoor atmospheres found in land regions of the city or industrial types, under moderate but not excessive acceleration, as affecting the usual types of bare or uninsulated overhead electrical conductors, including galvanized iron and steel. The test apparatus comprised a closed box about 16 ft. long, 5 ft. wide and 4 ft. high, with associated equipment for introducing warm dry air, humid air, dilute bituminous coal smoke, and fine water spray, at will. These four conditions were introduced in the order named, with a total cycle of 8 hours, repeated approximately 800 times. The specimens were 14 ft. long, arranged in a horizontal plane in the center of the box, with baffles causing the gases to pass across them several times. There were 21 specimens of wire and strand, including copper, aluminum, copper-clad steel, galvanized iron and galvanized steel; also a new type of stranded conductor, consisting of six outer wires of galvanized steel and a center wire of tinned or galvanized copper. These specimens were tested before exposure to determine the tensile strength, elongation, chemical analysis, weight of zinc coating, and number of dips under the Preece test. Periodical examinations were made of the specimens about every 100 cycles and their condition was carefully noted in the test log. The test was continued until all zinc coatings on exposed wires had failed, stopping after 793 cycles. Certain specimens were measured for tensile strength, loss of weight and decrease of diameter, at the end of the test. The method is regarded as reliable for obtaining comparative results, but at present no basis has been developed for equating the exposure into probable life in overhead service. An outdoor rack, with similar specimens, is now under test, but has not advanced sufficiently to report.

SECOND SESSION—WEDNESDAY, JUNE 24, 9:30 A.M.

Report of Committee B-1: On Copper Wire. J. A. Capp, Chairman.

Presented a revision of tentative specifications for hard-drawn copper trolley wire as result of cooperative work with American Electric Railway Association, and recommends their advancement to standard. Submitted as result of similar cooperation with A.E.R.A., proposed new tentative specifications for high-strength bronze trolley wire, as a revision of the present standard specifications.

Softening of Hard-Rolled Electrolytic Copper. Norman B. Pilling and George P. Halliwell.

A detailed study has been made, by means of tension tests, of the rates of softening of hard-rolled copper when reduced various degrees initially and heated at temperatures below 500° C. The quantitative effect of these variables is shown. The results indicate that copper has no minimum temperature of recrystallization but probably softens at a very slow rate even at atmospheric temperatures. Softening as shown by decrease in strength precedes visable recrystallization and has not been found to be initiated by a rise in hardness.

The effect of excessively long heating beyond that necessary to soften is shown to be slight at the lower temperatures, and the combination of amount of cold rolling, annealing temperature and length of anneal best suited for the production of highly ductile copper is discussed.

Report of Committee B-2: On Non-Ferrous Metals and Alloys. William Campbell, Chairman.

Presented new tentative specifications for Muntz metal condenser tube plates. Submitted revisions of standard specifications for copper wire bars, for Admiralty condenser tubes and for high sheet brass. Recommended advancement to standard of specifications for Muntz metal and brass condenser tubes. Submitted revisions of tentative specifications for light aluminum casting alloys. Presented a statement on the antimony situation.

A Note on the Microstructure of Aluminum-Iron Alloys. E. H. Dix, Jr.

In a previous paper the author has reported the results of a metallographic study of the occurrence of iron and silicon in aluminum of ordinary purity. The present paper deals with the occurrence of iron in alloys prepared from aluminum of much greater purity than was previously available. The microstructures of slowly cooled and chill-cast specimens are illustrated as well as some striking examples of segregation obtained in a small chill-cast specimen ¾ in. in diameter. It is further shown how this segregation was eliminated. A marked difference in the apparent eutectic concentration, as indicated by chill-cast and slowly cooled structures, is pointed out. The chill-cast eutectic structure is exceedingly fine and has, therefore, been illustrated at magnifications as high as 5,000 diameters. The effect of

annealing for one week at a temperature close to the eutectic temperature is described. The effects on the pure iron-aluminum constituent of the etching reagents commonly employed in the metallography of aluminum alloys are given.

Report of Committee D-14: On Screen Wire Cloth. R. W. Woodward, Chairman.

Included a description of exposure tests of seven different screen wire cloths now being installed in four localities: Bureau of Mines at Pittsburgh, Pa.; Portsmouth, Va., lighthouse; Panama Canal; and Bureau of Standards, Washington, D. C. Each type of cloth will be subjected to chemical analysis and phyical tests and also to an accelerated salt-spray test.

Report of Committee E-4: On Metallography. H. C. Boynton, Chairman.

Submitted a tentative recommended practice for thermal analysis of steel and reports on X-ray crystal analysis, and on micro-hardness as determined by the scratch-hardness method.

FIFTH SESSION—THURSDAY, JUNE 25, 9:30 A. M.

Fatigue Tests on Non-Ferrous Metals. R. R. Moore.

This paper gives the results of endurance tests on pure magnesium, aluminum, a forged and cast magnesium-aluminum alloy, and naval brass.

An improved type of rotating beam machine of wide range of use is also described.

In addition to the determination of the endurance limits, the ratio of endurance limit to other physical properties is developed. Special attention is given to the "endurance weight efficiency" and comparisons are drawn between light non-ferrous metals an alloy steels. The effect of a notch upon the endurance limit and the effect of ductility upon the notch effect is discussed. Endurance tests on certain of the light alloys run to 600,000,000 reversals of stress give evidence that there exists a definite endurance limit for some of the alloys of this class.

SEVENTH SESSION—THURSDAY, JUNE 25, 8:00 P. M.

Report of Committee E-9: On Correlation of Research. H. F. Moore, Chairman.

This is the first annual report of the committee, organized by the Executive Committee a year ago to study and develop that one of our functions stated in the charter as "promotion of knowledge of the materials of engineering." The report discusses briefly the committee's conception of its work, explaining that it will not conduct research and stating as its purpose to see that significant general conclusions about materials and significant gaps in our knowledge of materials are brought to the attention of the Society.

What the committee has so far accomplished is mentioned, including the prepartion of a List of Current and Proposed Researches and Investigations by A.S.T.M. Committees. Matters upon which it is working at present are briefly discussed, and plans for future activities are set forth.

Report of Committee E-1: On Methods of Testing. J. A. Capp, Chairman.

Submitted revisions of the methods of tension, compression and Brinell hardness testing of metallic materials and of definitions of terms relating to methods of testing. Submitted new tentative specifications for sieves for testing purposes. Presented a statement on the present status of the impact test. Reported the results of a general review of the present methods of the Society and presents recommendations on the preparation of methods of test in general.

Slush Castings

Q.—A firm making slush castings of a small antimonial lead toy, wishes to make these castings in multiple, that is 12 at a time instead of singly. They wish to do this by means of a special machine, of course, which will have a pouring ladle with 12 spouts to pour simultaneously into a bronze mold, large enough to hold 12 of these small castings. The pouring ladle will be operated mechanically of course, and the slushing will also be done mechanically. The pouring ladle will have to be kept hot constantly by means of a gas flame.

Do you think that such a proposition is practical? Will it require water cooling for the molds? Do you know if such a thing has ever been done successfully?

A.—In regard to the proposition of making 12 slush castings of an antimonial lead toy, we wish to state that we believe this is a practical proposition, providing, of course, that the mechanical outfit can be perfected. We have not had any experience in making this number of slush castings at one time, but see no reason why it cannot be done if the mechanical arrangement mentioned in your letter can be made up as above stated.

We do not think it will be necessary to keep the moulds cool with water. It might be necessary at times, if it is found that the moulds get too hot, to wipe across the same with a wet rag tied on a stick.

We have found it necessary to use this cooling method in making slush castings of a larger size than we suppose the ones contemplated being made by your reader.—E. L. M.

A.—As regards slush casting 12 small castings, using multiple mould, I do not recommend this method.

I used to make a small warbling bird for the United States and foreign markets in very large quantities. When I first started I cast one at a time in a die-casting machine, then two at a time and I tried six.

I found that to cast in multiple did not get me anywhere so I designed a die to cast only one but with great speed. Hand operated I cast six and seven gross per hour. It was the method of operating the die, etc., that gave results. Later I designed an automatic machine to do this and cast 1,500 per hour.

I found that when casting in multiple, several things happened. Long fins had to be trimmed, etc., which made the actual cost as much per piece as it was when only one was cast and cast perfectly. Usually the trimming of castings takes more time than the casting operation and when one tries to cast in multiple it results in fins which have to be trimmed. Also other things happen to the pieces and the dies. It is like having too many fingers in a pie.

I will say, however, that on some things it is all right to cast in multiple, some solid castings.

One of the recent developments is the slush casting of a boudoir lamp bases 50 to 60 per hour where the large manufacturers now cast only around 150 to 250 per day by the very hot laborious method of pouring by hand and turning the heavy hot mold over to dump the surplus metal out. This is all eliminated. The principle is to force the molten metal into the die, same being held in a swinging die bolster attached to the machine and when the shell has hardened the surplus metal is withdrawn with the mechanism instead of turning the die over to allow the metal to run out by gravity.—R. E. B.

New Plant for Dallas Brass & Copper Company, Chicago, Ill.

The Dallas Brass & Copper Company put into operation shortly after June 1, 1925, a new brass mill in which electricity will be used for every purpose excepting annealing, heating, and the generation of steam. For these exceptions, fuel oil will be employed. This is prompted by the joint motive of making the mill most modern in every respect and a restriction which has run with the property for years, that coal cannot be burned for industrial purposes.

FIG. 1. NEW MILL OF THE DALLAS BRASS & COPPER COMPANY

The site of the new mill is an 8½-acre tract at 6601 W. Grand Avenue, Chicago, Ill. Eventually, the address will be Dallas Place and Grand Avenue as a new thoroughfare to be called Dallas Place is now under construction. The building is 100 feet wide x 268 feet long, one story, modern, foundry-type building with steel sash walls, insuring a maximum of light, and a lantern-type roof for efficient ventilation. Wood block and concrete have been used for flooring.

From a Chicago, Milwaukee & St. Paul Railroad siding the raw material—ingot copper, electrolytic zinc and mill scrap—is delivered to storage bins having a capacity of 2,000,000 lbs. Magnetic separators are employed, of course, on the scrap before it is "cabbaged" for melting. The furnace charges are made up in a separate weighing room.

Melting equipment consists of four Ajax-Wyatt type furnaces of 900 lbs. capacity each. Since these furnaces, which are operated electrically, are of the induction type, local over-heating or contact with foreign materials cannot occur. The metal is poured into cast iron molds in which bars weighing approximately 100 lbs. each and ranging in width from 5 to 16 inches are formed. The breaking down, running down and finishing rolls are motor driven, and hence under close control.

Two late-type under-fired Rockwell furnaces are used for annealing between passes. These furnaces have chambers 6½ x 31 feet, inside. The final operations are pickling, slitting, flattening and whatever other treatment is dictated by the particular product.

At the new mill only brass in coils and sheets will be produced. To an extent, this product will be utilized in the main plant of the Dallas Company at 820 Orleans Street, Chicago, which is 100 x 213 feet, three stories and basement. Here copper is finished, as received from the mines in cakes, to any width and gauge, down to thicknesses as slight as 1/1000 inch and widths as narrow as 3/16-inch. Brass, bronze, nickel silver, zinc and similar metals are rolled to finish in coils and strips.

Much of this rolled product is for consumption in the lock-seam tube department, which is claimed by officials of the Dallas Company to be the largest of its kind in the United States. Copper, brass and steel are formed into lock-seam tubes in diameters from 3/16 to 3 inches, outside.

The company also operates a large press department, where intricate shapes are fashioned, and an eyelet department equipped with 14 late-type machines for the manufacture of small special parts. Recently the production of lighting fixtures for homes, apartments, and hotels, on a large scale, has been undertaken.

Officials of the Dallas Company are: Chairman of the Board, A. C. Dallas; president and treasurer, C. D. Dallas; assistant to the president, G. M. Fritch; vice-president and sales manager, H. S. Ullmann; secretary, F. D. Silber and assistant secretary, W. S. Houston.

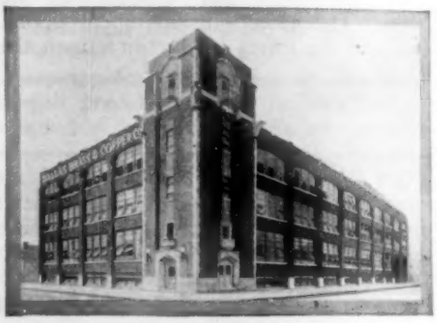


FIG. 2. MAIN PLANT OF THE DALLAS BRASS & COPPER COMPANY

Copper Piping

Q.—Would it be safe to use copper piping for service pipes in a house, i.e., for hot and cold water?

A.—The action of drinking water upon brass and copper pipes is so very slight that it is negligible. There has never come to our attention any effect detrimental to health due to drinking water passing through brass or copper pipes, and we believe that our experience in supplying pipes for drinking water over a long period of time is sufficient evidence.

Brass pipe has been used for carrying drinking water for the past sixty or seventy years, and its use has come to be very common indeed. In some localities there has been a preference for copper pipe, and it has been used for many years without question. We know from actual tests, where water is unusual in its action upon pipe, that the effect of such water upon copper pipe is so slight that it need not be considered.

When one considers that millions of pounds of brass and copper pipe are sold yearly and used principally for domestic water service, and that there has been no evidence of any detrimental effect upon health, there is sufficient practical argument that copper and brass pipes are safe and satisfactory to use.—F. G. S.

Metal Cooking Utensils

Q.—Can you tell us what advantages copper has over aluminum for cooking utensils and what danger, if any, comes from tin-lined copper?

A.—1. Tinned copper was the original material used for kitchen ware. It was attractive in appearance, solid and safe so long as the tinned coating was perfect. It has no advantages over aluminum that we know of except perhaps in large kitchens where copper utensils, because of the fact that they can be made in large sizes, are more practical than aluminum.

2. There is no danger from the use of aluminum for foodstuffs that we have ever heard of.

3. Both tinned copper and aluminum are safe to use with fruit acids. Common salt acts very feebly on aluminum. When an acid is present with the salt the action is stronger, but the corrosion is so slight as to be of little practical consequence.—T. M. I.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year : : SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order; Cash Should Be Registered

ADVERTISING RATES ON APPLICATION. FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon.....Editor and Publisher
Adolph Bregman.....Managing Editor
Thomas A. Trumbour.....Business Manager
Evan J. Robinson.....Advertising Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number: Beekman 0404. Cable Address: Metalustry

Vol. 23 New York, July, 1925 No. 7

Contents

Buyers' Guide—Advertising Page 77. Edition this month, 6,000 copies.

EDITORIAL

PLATERS' CONVENTION

Several things stood out sharply at the Montreal Convention of the American Electro-Platers' Society. In the first place, the papers read were of the very highest order. In the second place, prizes were awarded for the first time for meritorious work, and this cannot but result in a strong incentive to future development. The new officers are popular and capable men, and will undoubtedly serve the society well.

A point of special interest was the suggestion by Walter Gold, of Philadelphia, that a committe be appointed on Health and Health Protection. When we remember the lengthy investigation of the Boston Branch last year into the causes and cure for nickel itch and cyanide sores, it is obvious that this suggestion is eminently worth following out. No one knows better than the plater the hazards and dangers connected with the plating shop. Although these dangers are not startling, they are present and all the more to be feared because they seem so slight. Acid fumes, cyanide solutions, and warm, humid atmosphere all combine to make the plating shop a place to be watched and carefully managed.

We strongly recommend that Mr. Gold's suggestion be acted upon favorably. The American Electro-Platers' Society would be adding another item to its long list of good works accomplished, by initiating this movement.

Manufacturers now have ample time to prepare for the next meeting and to arrange to send their plating foremen. The viewpoint of the progressive manufacturer was illustrated by the fact that the Mueller Manufacturing Company sent three men to this convention. No money could be invested better than that used for sending men to a gathering where they hear the technical details of their work discussed and can have their questions answered by the foremost experts in the country.

A word of advice to equipment manufacturers would not be amiss. For some reason or other equipment exhibits were not as great in number as they should have been. This may have been due to the fact that the convention was held in Canada and customs difficulties were feared. However, all that is water under the bridge and may be dismissed. The point to remember is that next year the meeting will be in Newark. Let the equipment manufacturers show their enterprise and make their part of the affair as good as the platers'.

TESTING MATERIAL SOCIETY

The 28th Annual Meeting of the American Society for Testing Materials, a report of which appears on page 282 of this issue, shows another gain in its membership which now totals 3,718. The steady growth and increasing strength of this society will be easily understood when its work is known. Its researches, standard specifications and its co-operation with the standardization program of the Department of Commerce have made it one of the leading technical societies of the world. Its object, in a few words, is the promotion of the knowledge of engineering materials through research and publication, and propaganda for the greater use of existing knowledge.

The Society is one of the leaders in investigating corrosion of metals and corrosion tests which will parallel actual operating conditions. At the last meeting several valuable reports and papers were read on this subject, among which were Accelerated Corrosion Tests on Bare Overhead Electrical Conductors by F. F. Fowle. Among other papers of special interest were Some Fatigue Tests on Non-Ferrous Metals by R. R. Moore, and the Purchase of Materials on Specification by Dean Harvey.

Committee E-9 on Correlation of Research has for its function the work of seeing that significant general conclusions about materials and significant gaps in knowledge of materials are brought to the attention of the society. This Committee made a survey of the investigations in progress at the present time and as a result published a list of current and proposed researches and investigations as of March, 1925. Among these researches, those concerned primarily with metals, are as follows:

Atmospheric Corrosion Tests of Metallic Coated Products.

Comprehensive field tests at several locations representing varying atmospheric conditions on metal products coated by various processes, e.g., hot-dipped galvanized sheets, wire products, structural shapes and castings; sherardized castings; electro-zinc plated castings; zinc-coated sprayed castings and structural shapes; terne-coated sheets; lead-coated sheets; cadmium plated castings and calorized castings. An important purpose of the tests is to correlate results of service with various types of laboratory, including accelerated, tests.

Copper Wire.

Non-Ferrous Metals and Alloys.

A study of the best type of test bars for various cast non-ferrous alloys. The relationship between properties of the test bars and properties of the metal in the castings they represent is involved in this project.

General Study of Properties of Babbitt Metal.

This project includes determination of physical properties of white metal bearing alloys in the A. S. T. M. tentative standards; correct pouring temperatures of babbitt metals; effect of ratio of length to diameter in compression testing of babbitt metal, and effect of impurities on the properties of babbitt metal, such as friction and wearing properties, fluidity, brittleness, and amount of drossing.

Properties of High Strength Light Alloys.

Committee B-2 has appreciated the importance of promoting knowledge of the properties of high-strength light alloys. An important step that was taken in 1924 was the presentation of report on this subject giving the properties

of Duralumin and Alloys 17 S, 25 S and 51 S produced by the Aluminum Company of America. A similar report on magnesium alloys is in preparation.

Corrosion of Non-Ferrous Metals and Alloys.

A study of four corrosion tests, viz., total immersion, alternate immersion, spray, and accelerated electrolytic. Six non-ferrous metals will be tested by a number of co-operating laboratories, each following carefully prescribed methods and reporting data on standardized forms.

Refractories.

This committee has recently organized its work and now includes on its roster a Sub-Comittee on Research. This Sub-Committee is expected to develop new tests that are not immediately applicable to specifications. When a test has reached the point where it is ready to be embodied in specifications, it is placed in the charge of a Sub-Committee on Tests and Specifications.

Similarly, there is a Sub-Committee on Industrial Survey which is intended to keep Committee C-8 in intimate touch with the actual requirements in the industry. This sub-committee is charged with investigating all of the uses of refractories, determining the limits required, and presenting them in such form that the Sub-Committee on Tests and Specifications will have the information necessary for its work.

Screen Wire Cloth.

1. Relative Life of Various Screen Wire Cloths. Relative life of various screen wire cloths under various atmospheric conditions. The project includes copper, commercial bronze, low brass, aluminum bronze, silicon bronze, and Ambrac metal cloth.

2. Methods of Testing. Initiate conduct and report research upon such engineering constants, methods and instruments of testing and fundamental problems of interest to the Society, as do not come within the function of any other standing committee.

Two subjects upon which the committee is engaged that are in the nature of research are:

(a) Impact Testing.

(b) Study of properties of plasticity, consistency and related properties of materials.

3. Metallography.

The work of this committee is essentially that of developing standard methods. The committee in 1924 completed work on development of methods of metallographic testing, photography and the like and now has the following three projects under way:

a. Thermal Analysis of Metals.

Study of thermal analysis of metals, including standard methods.

b. Study of Micro-Hardness.

c. X-Ray Crystal Analysis.

Nomenclature and Definitions.

An added evidence of the activity of the Society is the establishment of a fund for a medal to be known as the Charles B. Dudley Medal, named after the first president of the Society. This medal will be awarded to the author of a paper of outstanding merit presented before the Society, constituting of an original contribution on research in materials. Also an Annual Lecture is established to be known as the Edgar Marburg Lecture, named after the Society's first secretary. This lecture will be delivered annually by a leader in the field of engineering materials who will present outstanding developments in this field.

The development in the United States of Standard Specifications and Methods of Testing Materials through the work of the American Society for Testing Materials has been admirably summarized by C. L. Warwick, Secretary-Treasurer of the Society, in a paper presented at the first Pan-American Convention on Uniformity of Specifications, Lima, Peru, December 23; 1924. Those interested in the Society and its work are urged to read this paper which will give them a birdseye view of the study of engineering materials in the United States.

BASIC RESEARCH

A recently issued report of the Board of Visitors to the Bureau of Standards, for the Secretary of Commerce bears some unusually interesting conclusions which should be brought before all industrial executives. Briefly, this Board puts the emphasis of its report on Basic Research —in other words, the acquisition of knowledge without immediately useful objects. It was stated that the Bureau of Standards had not done as much work of this sort as it should during recent years. It was pointed out that industrial research was essential to prosperity and that too few agencies were concerned with fundamental problems.

"The history of civilization is filled with illustrations of the utilization for the good of humanity of the results of scientific work, undertaken without reference to its direct value and often remaining unused long after its first announcement," the report states. Illustrations given are the electrical industry, radio, the vacuum tube, X-rays, and radium. In each case the fundamental discoveries that made invention possible were made without thought of possible utility. Similarly, the present day study of atomic physics is cited as a line of research that is likely in the future to yield results of vast proportions as yet undreamed.

It is generally admitted, of course, that industrial research pays when it is undertaken properly and carried out efficiently. An example of such savings is the fact that in the autmobile industry, research has resulted in saving $155,000,000 per year to the automobile purchasing public. However, this type of research is essentially practical in character. It aims directly at cutting costs or improving the project or methods used in making said product. Basic or fundamental research, on the other hand, is very unlikely to show quick returns and for that reason can be undertaken only by the most powerful industrial corporations or Government bureaus. It is eminently proper that a Government bureau should be engaged in this type of work since the Government is concerned not so much with the immediate cost as with the ultimate usefulness of the results and the benefit to the entire nation. Moreover, a national laboratory will give its results freely, benefiting everyone, whereas a private institution is necessarily hedged in by the question of costs and profits.

CORRESPONDENCE and DISCUSSION

Although we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

METAL CLEANING

To the Editor of THE METAL INDUSTRY:

The publicity which you have been giving to the subject of metal cleaning is bound to be of help to your trade. Answering the questions suggested in an editorial on the subject of "Buying Cleaners" which was run in your March issue, there is only one way for a buyer to find out whether or not the price he pays is justified and whether or not the material is of a quality which should be used in his plant.

The way we have in mind applies to the purchase of any other material and that is for the buyer to become familiar with some of the main technical features of the material. If a man is to be a capable buyer for a concern, he must expect to know something about the technical features of the various supplies he purchases.

It is no longer necessary to buy cleaners in the dark. Manufacturers of repute can tell the whole story about their products explaining why one cleaner is better than another for a certain piece of work and discussing how they arrive at the conclusion that one compound or mixture is more efficient under certain conditions than another.

In other words, a buyer must expect to have the seller tell him something more than the bare name of the material.

Incidentally the article prepared by Mr. Mitchell on "Cleaning Metals Today" is an authoritative presentation of the matter which every user of metal cleaners should clip and read frequently.

THE COWLES DETERGENT COMPANY,
S. H. Fellows, Sales Manager.

Cleveland, Ohio, June 20, 1925.

CASTING BANJO KEYS

To the Editor of THE METAL INDUSTRY:

With regard to shop problems 3,364 entitled Brass Banjo Keys, the only way to make them commercially is to gate them according to the different sizes used and have enough gated patterns to fill a flask. The reason for this is that you have to use a gas blow torch so that you will not blow over the small green sand cores by the force of the flame. I would have a boy dry these molds and he will take as much time as the molder will to put them up. After drying I would leave them open on the floor and close the molds only before pouring. I got 95 to 98 per cent results doing this 30 years ago for Mr. Pilstrup, the patentee, now dead. I believe that I used salt in the water to temper the sand and get it quite dry. Also hold the riddle high to get a good drop of the sand and throw the sand to force it down the squares. Before this method was developed I could get only 25 per cent good castings.

If you use a blow torch for the drying, you must develop a mixture of some kind to add to your water. The sand mixed or tempered with this water must stand the blow torch flame, without being burned, or the cores turn white.

Chicago, Ill., June 17, 1925. OSCAR BOECK.

WHITE SPOTS IN NICKEL PLATE

To the Editor of THE METAL INDUSTRY:

With regard to your Problem 3,385, will say that if the plater who is having trouble with his nickel solution on account of white spots on nickel would add at least 3 ozs. of sulphuric acid, 66°, in his solution at the close of day for 2 or 3 days he would find his trouble gone. When the white spots are gone, he may rebuild his solution by your method or mine. Or he can use boracic acid, 2 to 2½ ozs. sprinkled in the solution at the close of day. Be sure to have no lumps. Add 1 to 2 ozs. of sodium chloride and ½ to 1 lb. of single nickel salts. If the white spots are what I suppose they are, they will be hard to buff. ANDREW V. RE.

Coldwater, Mich., June 15, 1925.

INVESTING IN THE METAL INDUSTRY

To the Editor of THE METAL INDUSTRY:

Enclosed please find check for one dollar to cover my subscription for 1925.

This is my 20th investment in your paper and I have never made one that has brought me more profit and pleasure as the years go by.

Best regards to all. Sincerely,
Detroit, Mich.. BENJ. W. GILCHRIST.

NEW BOOKS

Metalltechnischer Kalender for 1925. By Dr. W. Guertler. Published by Gebrüder Borntraeger, W. 35 Schöneberger Ufer a, Berlin, Germany. Size 4 x 6, 372 pages.

This is the well known annual publication which consists of tables of physical and chemical data on metals, with thermal equilibrium diagrams, and practical shop information.

Metal Statistics for 1925. Published by the American Metal Market. Size 4" x 6", 536 pages. Price, payable in advance. For sale by THE METAL INDUSTRY.

Metal Statistics contains useful and authoritative statistics relating to production, consumption, imports, exports, stocks and various other data that is indispensable to those who desire a complete and accurate knowledge of important market and trade information. Those who are engaged in interpreting various statistical movements of metal markets will find it very valuable.

Scrap Metals. By Manlove and Vickers. Published by Penton Publishing Company. Size 6 x 9. 275 pages. Price, payable in advance, $5.00. For sale by THE METAL INDUSTRY.

This is the second edition of the well known book which is the only tratise dealing with the scrap metal industry. A large part of this volume is devoted to the steel and iron business, but metals are covered in some detail by Mr. Vickers.

All of the material in the first edition is included and additional chapters as follows: Grading Non-ferrous Scrap; Iron Undesirable in Scrap Brass; Aluminum May Be Removed; Rarer Elements Harmful Only in Excess; How to Pick Lead Bearing Scrap; Using Scrap Metals in Alloying; Reclaiming White Metals and Residues.

The Story of Copper. By Watson Davis. Published by the Century Company, New York. Size 5 x 8, 385 pages, illustrated. Price, payable in advance $3.00. For sale by THE METAL INDUSTRY.

This is a non-technical book about copper which has played so great a part in the civilization of man. It tells in simple style the story of copper from its genesis to the complex present day alloys, and also offers suggestions for its future. The book is written essentially for the layman, but will make interesting reading even for the metallurgist. It covers mining, smelting and refining, chemical and physical properties, uses, commercial, artistic, and military.

The Story of Copper is one of a series of non-technical books on such subjects as chemistry, rubber, drugs, etc. It is an interesting and useful volume.

Employees' Representation in Steel Works. By F. M. Selekman. Published by the Russell Sage Foundation. Size 5¼ x 8. 293 pages, Price, payable in advance, $1.50. For sale by THE METAL INDUSTRY.

This is one of the industrial studies carried on by the Russell Sage Foundation in the organization of relations between employes and employees in industrial enterprises in the United States. It describes the methods of introducing employees' representation in the Colorado Fuel & Iron Company; gives the essential features of the representation plan which include committees on industrial co-operation and conciliation;

safety and accidents, sanitation, health and housing, recreation and education; introduction of the effect of the 8 hour-day; determination of wages; adjustment of grievances; accomplishments and limitations of employees' representation.

It is a decidedly fair-minded and useful book.

Hendricks Commercial Register, 1925. Size 8½" x 11". 2522 pages. Price, payable in advance, $12. For sale by THE METAL INDUSTRY.

The thirty-third edition is now off the press and ready for distribution. It shows the result of almost thirty-five years of painstaking endeavor plus a modernization of methods which will serve industrials who wish to purchase in the most efficient and economical way. It is a huge volume, yet it is compiled typographically in such manner as to contain the maximum amount of information without being unwieldy, and making it one of the most complete directories of the products of American manufacturers in existence.

Hendricks Commercial Register is the "daddy" of all business reference publications, enjoys high prestige among the men who buy or specify in manufacturing or jobbing concerns in all lines as well as among contractors, architects, engineers and others.

Ability to Sell. By Merrill Jay Ream. Published by Williams & Wilkins Company. Size 5½ x 8. 64 pages. Price, payable in advance, $1.25. For sale by THE METAL INDUSTRY.

This book gives the details of an experiment with life insurance salesmen, the author being one of the officers of the Mutual Life Insurance Company, Newark, N. J. It covers the findings of a trained employment psychologist in his efforts to work out standards for hiring and retaining salesmen of this group. Although the field is hardly akin to metal manufacturing, the basic principles of salesmanship apply of course, and for that reason the book should be interesting to all those who have the problem of hiring and managing salesmen.

Briefly the results of the work are as follows: a method was found for evaluating previous experience and scores in the psychological tests which differentiated the successful from the unsuccessful salesman. The statistical data of this method served as a test for a description of the personality of the successful salesman.

Among specific topics covered are the following: The Observation of the Field Work of Salesmen; Previous Use of Tests for Salesmen; The Present Method; Criterion of Success; Descriptions of Tests.

Materials and Their Application to Engineering Design. By E. A. Allcut and E. Miller. Published by J. B. Lippincott Company. Size 6 x 9, 519 pages. Price, payable in advance, $12.50. For sale by THE METAL INDUSTRY.

This book is really a course for practical engineers and designers prepared from the standpoint of works practice. Its object is to teach the engineer, or the man who specifies and uses materials, how these materials are produced, and how they can be used. Necessarily, such a book consists largely of methods of testing and inspection, and the application of the results of this type of work to design and construction.

Among the subjects covered are testing and measurement of stresses; strain measuring apparatus; impact testing; measurement of hardness; chemical composition and microstructure; heat treatment; non-ferrous metals and alloys; bearing metals; inspection of materials; examples of practical application; useful tables and data.

With the rapidly growing importance of testing and testing methods, a compilation of this sort, written from the standpoint of the user of metals as well as the laboratory specialist, and emphasizing practical more than theoretical aspects, this book should have a wide range of usefulness.

The Effect of Temperature Upon the Properties of Metals. Published by the American Society for Testing Materials, Philadelphia. Size 6 x 9—184 pages. Price, payable in advance, $1.50. For sale by THE METAL INDUSTRY.

The pamphlet is a reprint of the papers and discussions at a symposium on this subject held at a joint meeting of the American Society for Testing Materials and the American Society of Mechanical Engineers. These papers and discussions constitute a most comprehensive review of the present knowledge of the subject—the only things of its kind, so far as is known. The four papers deal with industrial applications, methods of testing, available data on properties of irons and steels, and available data on the properties of non-ferrous metals. Each one is concisely presented. The principle methods of testing have ben reviewed and the most recent developments outlined. The last two papers comprise a very thorough presentation of the representative data on tensile, torsion, hardness, crushing, impact, flow, expansion and other properties of metals under various temperature conditions, the data being classified for such materials as cast and malleable iron, cast steel, wrought iron, carbon steels, ordinary structural alloy steels, and high alloy content and the so-called "heat resisting" steels; and in the non-ferrous field, for copper, brasses, bronzes, cupro-nickel, nickel and nickel alloys, aluminum and aluminum alloys, bearing metals, etc. A feature of the reprint is the bibliography which contains 216 references arranged in chronological order. An index to the bibliography facilitates the location of articles dealing with specific tests of given materials. About 50 pages of interesting discussion give considerable supplementary information.

TECHNICAL PAPERS

Brinell Hardness Numbers. Miscellaneous publication No. 62 of the Bureau of Standards, Washington, D. C.

A table listing Brinell hardness numbers at 500 and 3,000 kilograms loads alongside of the diameter of indentation; a handy table which eliminates a great deal of calculation.

Hydrogen Ion Measurements in the Electrometallurgy of Nickel. By WILLIAM A. MUDGE.*

The **hydrogen electrode** and **colorimetric drop-ratio** methods for determining hydrogen ion concentration, pH, have been found applicable to the electrometallurgical refining of nickel. Curves are given showing the characteristics and rate of change in pH, upon addition of acid or alkali, of typical nickel electrolytes. The effect of pH, temperature and circulation upon the removal of copper and iron from the electrolyte, distribution of voltage, electrode potentials, polarization and specific resistivity of the electrolytes are discussed as factors influencing the purity and quality of nickel produced.

Thermal Expansion of Aluminum and Various Important Aluminum Alloys, by Peter Hidnert. Scientific paper No. 497 of the Bureau of Standards.

This paper gives data on the linear thermal expansion of 4 samples of aluminum and 51 samples of important aluminum alloys. The preparation, chemical composition, heat treatment, etc., are included. Most of the specimens were examined from room temperature to about 500° C. Typical expansion curves of the various groups of samples are shown and discussed; also a description of the apparatus used in this research and a review of available information obtained by previous observers on the thermal expansion of aluminum and some of its alloys.

The expansion of cast aluminum (99.95 per cent) from room temperature to 610° C. is as follows:

$$L_t = L_o [1 + (22.58t + 0.0098t^2) 10^{-6}]$$

The relations between the chemical composition and coefficients of expansion of aluminum-copper alloys (4 to 12 per cent copper) and aluminum-silicon alloys (4 to 12.5 per cent silicon) are shown in figures. The anomalous expansion of two aluminum-zinc alloys at constant temperature (about 270° C. on heating) is shown. From the results of previous observers and the present research, it is evident that the aluminum-zinc alloy of eutectoid composition (about 79 per cent zinc) shows the greatest change in expansion at the transformation or eutectoid temperature. A triangular diagram is shown which indicates the effect of change of composition on the co-efficients of expansion of aluminum-silicon-copper alloys lying near the aluminum corner of the ternary system. The table in the summary gives a comparison of the average co-efficient of expansion of samples investigated.

*Abstract of paper presnted at the meeting of the American Electrochemical Society at Niagara Falls, N. Y., April 23-25, 1925.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ANTI-ACID METAL

Q.—Would you kindly advise us the best formula you can offer for metal that will withstand the action of sulphuric acid 66°.

We have a tannery customer who is having trouble with valves and cocks we have furnished, made from a formula we have used for quite some time.

The peculiar coincidence is the fact that we do not find this metal acted upon by placing these goods in a closed vessel containing sulphuric acid, but our customers inform us that the goods under service are sufficiently affected, following a few days' use, to necessitate their removal.

A.—The best formula to withstand the action of sulphuric acid, and resist the corrosive actions of salt water, tanning and sulphite liquors, better than any other bronze is 90 copper and 10 aluminum.

It requires considerable skill to make satisfactory sand castings. However, if you use the best metal, Lake or Electro copper and virgin aluminum, and give the gate a long run into the casting, use chills wherever possible and large risers you will be successful.

It is necessary also to use a flux for this metal. Manganese copper 30% manganese, is good. However, manganese copper may answer your requirements. Use ½ lb. per hundred pounds of metal.—W. J. R. Problem 3,387.

BLACK ON ZINC OR LEAD

Q.—How can I get a black coat on zinc? On lead?

A.—It is our opinion that a black nickel deposit would be the most satisfactory deposit on the zinc and lead to obtain a uniform deposit. We suggest the following formula: water, 1 gallon; nickel chloride, 6 ozs.; ammonium chloride, 6 ozs.; sodium chloride, 2 ozs.; Rochelle salts, 1 oz.; zinc chloride, ¾ oz.

Prepare the solution in the order given, using hot water for its preparation. For best results operate at 80° to 100° F. The solution, however, may be used cold. Voltage should not exceed ½ to 1. An immersion solution is as follows: water, 1 gallon; caustic soda, 73-76 per cent, 4 ozs.; oxide of antimony, ⅛ to ¼ oz. Temperature of solution, 120° F. The above proportions may be changed to meet requirements. The zinc must be clean and free from oxidation before immersing. If lead is plated with a thin deposit of zinc, it can be blackened in the solution. Both the black nickel and the antimony black surface will have to be lacquered to protect them from atmospheric influence.—C. H. P. Problem 3,388.

BLUE DIP FOR SILVER

Q.—What is a good blue dip for silver?

A.—Blue dip on silver: Try the following solution for a blue oxidize on any metal, including silver: water, 5 gallons; nitrate of lead, 4 ozs.; nitrate of iron, 2 ozs.; hyposulphite of soda, 16 ozs.; temperature, 180° F. Or the following solution may be used: water, 1 gallon; hyposulphite of soda, 8 ozs.; lead acetate, 4 ozs.; acetic acid, ¼ oz.; temperature, 180° F.

The colors change from yellow, red to blue. The time of immersion and the temperature of solution are the factors in production of blue colors.—C. H. P. Problem 3,389.

BROWN ON BRASS

Q.—How can I produce a yellowish brown finish called Policheck Bronze?

A.—We are not familiar with Policheck bronze. There is a chandelier firm in Milwaukee, Wis., by the name of Policheck Company; possibly the color is one of their productions. Barium sulphide is, no doubt, the best factor. Try the following solution: water, 1 gallon; sodium cyanide, 7½ oz.; copper cyanide, 4 oz.; zinc cyanide, ¾ oz.;; bisulphide of soda, 2 oz.; bronze anodes, 90 per cent copper and 10 per cent zinc. Dissolve the sodium cyanide in one-third the water at 140° F. Add the copper and zinc, then add the balance of the water cold, and then the bisulphite of soda a little at a time. Voltage 4 to 5. **Use no ammonia** but about ½ oz. hyposulphite of soda to 100 gallons of solution. If the barium sulphide does not give you the color you want, then try hydrosulphuret of ammonia about ½ to 1 oz. per gallon of water cold. You can purchase this material from advertisers in THE METAL INDUSTRY.—C. H. P. Problem 3,390.

CLEANING SILVER AND GOLD PLATE

Q.—Will you please send us formula for making a dip solution to clean silver plated and gold plated band instruments?

A.—For cleansing silver and gold plated band instruments previous to re-color buffing, which we presume you have in mind, prepare a bath of hot water of sufficient capacity. The temperature should be at least 160° F. Add sodium cyanide, 96-98 per cent, to the hot water, say, ½ oz. to 1 oz. per gallon. Immerse the instruments in the solution for a moment or two until the surface oxide is removed. If buffing is to be dispensed with, then cleanse with floated English gilders' whiting, mixed with equal parts of denatured alcohol and water. Rub over the surface with a soft cloth; allow to dry, then polish with Canton flannel.—C. H. P. Problem 3,391.

COPPER PLATING LEATHER

Q.—Will you tell me how to prepare leather for a copper solution, preparatory to running it in a silver or gold solution?

A.—The most satisfactory method for preparing leather to be copper plated in copper sulphate solution as a basis for any other electro-deposited metal, would be as follows: Coat the leather surface with 1 or 2 thin coats of orange shellac; cut in denatured alcohol. When thoroughly dry, spray one or two coats of copper bronze powder, mixed with a regular celluloid or gun cotton lacquer as the bronzing medium. Or mix the bronze powder with a turpentine copal varnish and then spray on the leather surface. When the leather coated surface is thoroughly dry and hard, copper plating can be done. It is sometimes advisable to immerse copper bronze coated surfaces in a weak silver cyanide solution to give a white tone to the bronze powder.

The deposit of copper in solution is then more perceptible and its uniformity of deposition can be more readily followed.—C. H. P. Problem 3,392.

DARK BROWN ON BRASS

Q.—I am mailing to you under separate cover a sample of brass article with dark brown finish. How can I reproduce it?

A.—It is difficult to decide just what solution to advocate to produce the dark chocolate bronze tone on brass, such as sample you have submitted. In many instances such colors or tones are due mostly to manipulation, or a final toning in a dilute solution, prepared from the original basis solution. We suggest the following procedure: 1. Cut down the brass with Tripoli composition and regular buffs. 2. Cleanse, acid dip or scratch brush wet. 3. Copper plate for a moment in a copper cyanide solution, just to get a thin uniform deposit of copper on the outside of the shell, etc. 4. Prepare a solution consisting of water, 1 gallon; sulphide of barium, ½ oz. Temperature, 200° F. Immerse the shells in the dip until they become almost black, then remove them; wash and dry; scratch brush dry by the aid of a soft crimped steel or brass wire scratch brush. Then lacquer. It may be necessary to give the articles a second quick dip in the solution after scratch brushing to bring up the tone of your sample. Then wash, dry and lacquer. Do not rescratch brush. Golden sulphuret of antimony may also be the factor for this color. The solution should be prepared as a basis with water, 1 gallon; caustic potash, 1 to

2 ozs.; golden sulphuret of antimony, ⅛ oz. upwards per gallon as may be required. Temperature, 180° F. Just a trace of liver of sulphur may help to darken the tone. It may be possible to produce the color on brass with this solution; if it fails, use the copper strike.—C. H. P. Problem 3,393.

DEFECTIVE COPPER PLATE

Q.—We have recently made a 500 gallon acid copper solution. We dissolved the copper sulphate until the solution stood 12 on the hydrometer, then we built it up with sulphuric acid until it stood 15. On steel work we strike it in the nickel solution first, but after copper plating it for about 15 or 20 minues the copper plating can be pulled off in strips. With our old copper solution, similar to the one above, the copper plating sticks, but it streaks quite heavily, and when we try to buff out the streaks we buff through the other plating.

A.—We suggest that you add about 8 ozs. more copper sulphate per gallon of solution, then add 4 ozs. more sulphuric acid per gallon. Make this test in a 10 or 20-gallon solution. If the non-adherence of the copper still continues, then add from 1 to 2 ozs. powdered alum. These additions should remedy the trouble. Your old solution can be remedied by the addition of acid 2 to 4 ozs. per gallon and 1 oz. powdered alum. The addition of ⅛ oz. yellow dextrine per gallon will produce a still better copper deposit. It is advisable to agitate either the copper solution or the work rod for best results.—C. H. P. Problem 3,394.

ETCHING

Q.—Will you kindly advise us the best method to etch names on steel swords, or to remove the ground, leaving the name raised? Please state whether it is best to paint with resist solution directly on to metal, or is it possible to sketch on some kind of transfer paper, apply in some way to steel, and etch.

A.—We would suggest that you read the article on Etching in our issue of March, 1924, page 113, and note in particular the transfer method. Henley's Book of Receipts and Processes, and the Scientific American Encyclopedia, Local Notes and Queries, give full details covering etching processes.—C. H. P. Problem 3,395.

FREE TURNING BRASS

Q.—I would like a little information in regard to free turning brass rod and wire. The rod and wire we have been making for years does not seem to suit.

A.—The free turning quality of brass is wholly governed by the amount of lead in the alloy. The higher the lead content of the alloy is, the freer it will turn. As the addition of lead reduces the ductility of the brass, the limit is the point where the brass cannot be rolled or drawn economically. Where the extrusion process is used, a higher lead content can be carried than where the breaking down process consists of cold rolling the rod castings.—W. J. P. Problem 3,396.

GOLD PLATING

Q.—What is a good formula for gold plating musical instruments, like saxophones? I am using soap suds for burnishing with steel tools, but this seems to drag or pull. What is a good gold solution for watch chains?

A.—The gold plating solution used by the manufacturers of band instruments in Elkhart, Ind., the seat of the band instrument industry, is as follows: water, 1 gallon; sodium gold cyanide, ½ oz., minimum; sodium cyanide, 96-98 per cent, ¾ ozs., minimum; pure caustic potash, ¼ oz., minimum. Temperature of solution, 160° F. Voltage, 2½ to 3½ anodes, fine gold. The solution should be agitated or the anode moved freely during deposition. For burnishing, use bloodstone burnishers, not steel; for lubrication, Castile soap chips, made slightly alkaline when in solution with a small amount of powdered borax or tri-sodium phosphate. For gold watch case plating, add to the above gold solution ¼ oz. nickel cyanide; dissolve this amount in an equal amount of sodium cyanide, 96-98 per cent, before adding to the gold solution. Use a little hot water, 160° F., for solution. The addition of ¼ oz. or less of sal-ammoniac per gallon of solution will influence the reduction of the nickel with the gold.—C. H. P. Problem 3,397.

GOLD SOLUTION

Q.—Some time ago I saw a formula used in making up a 24 K. gold solution, and instead of cyanide of soda, yellow prussiate of potash was given. Can you give me this formula again?

A.—We presume you have reference to the following formula for 24 K. gold solutions without sodium cyanide: water, 1 gallon; yellow prussiate of potash, 2 ozs.; carbonate of soda crystals, 2 ozs.; sodium gold cyanide, ½ oz. It may be necessary to use very little sodium cyanide when the solution is first prepared. Use about ⅛ oz. per gallon. Another formula of this type is composed of the following: water, 1 gallon; yellow prussiate of potash, 3 ozs; caustic potash, ½ oz.; soda ash, 1 oz.; phosphate of soda, 1½ oz.; gold trisalyt, ½ oz.

The most efficient solution, however, is one prepared with equal parts of sodium cyanide and sodium gold cyanide from ⅓ oz. each and upwards per gallon of water, with ⅓ oz. phosphate of soda. Temperature, 160° F.—C. H. P. Problem 3,398.

GUN METAL DIP

Q.—What is a good gun metal dip?

A.—Gun Metal Dip: The best gun metal finish is produced by coating the articles first with a thin deposit of silver; scratch brush wet, then immerse in a solution composed as follows: water, 1 gallon; hydrosulphuret of ammonium, ½ oz. or more per gallon; temperature, 140° F. The color will turn to a dark gun metal blue. Remove; wash in cold and boiling waters; dry out in sawdust and scatch brush dry, using a very soft and preferably worn brass scratch brush; finally, lacquer. Try the following dip solution which was devised for gun metal finish on die castings: water, 1 gallon; caustic soda, 73-76 per cent, 5 ozs.; powdered white arsenic, 2½ ozs.; sodium cyanide, 96-98 per cent, 1 oz. Temperature, 180° to 200° F. There are a number of solutions that can be used for gun metal finishes; see Platers' Wrinkles.—C. H. P. Problem 3,399.

HIGH LEAD MIXTURES

Q.—We have bought some new metal that is high in lead, and I am having a great deal of trouble in casting this metal. The casting are bushings and bearings, a casting that has to stand pressure. I have cast some that were porous, some at the bottom, the top being all right. When they get in the machine shop or when you take them out of the sand the casting seems first class. How can I overcome this?

One other thing I would like to ask. I have some high lead metal to mix and would like to know a way to keep the lead from sweating out. I have used phosphor copper 30% and sulphur and galna ore and I have got good castings, but I think there is something better on the market. If there is please let me know.

A.—For high lead metal we suggest a thin flat gate into the casting and a facing sand to be used on the mold consisting of 20 parts old molding sand, 5 parts new molding sand and 1 part pitch compound. Use as a flux, 1% of a mixture of 50% nickel and 50% copper. This can be bought from the smelters, the address of which you can obtain from the list in the METAL INDUSTRY.

To make a high lead metal say 25% to 30% lead use 4% tin, the balance copper and 2% of the copper-nickel alloy.—W. J. R. Problem 3,400.

IMPURE NICKEL SOLUTION

Q.—Have just had a fire in our plant and foreign matter must have gotten into the nickel solution. The plate has small blotches that rub off easily. What is the cause?

A.—It is difficult to decide just what impurities have gotten into your nickel solution from the result of an outbreak of fire in your plating department. We suggest that 2 ozs. sal-ammoniac per gallon of solution be added to increase the conductivity and anode reduction. An addition of 1/32 oz. of pure muriatic acid per gallon will then, no doubt, produce an even nickel deposit, providing the solution contains ample metal. If not, an addition of 2 to 4 ozs. single nickel salts per gallon of solution may be necessary. Try these additions with a 10-gallon test solution taken from the solution that is now giving trouble.—C. H. P. Problem 3,401.

NICKEL ANODES

Q.—We have been advised that nickel anodes 99 per cent pure are not as soluble and therefore not as economical as anodes 90 per cent to 92 per cent pure. These are cast anodes. Will you kindly advise us as to the merits of the different purities of nickel anodes for electro-plating?

A.—Your informant was correct; 90-92 per cent cast nickel anodes are more soluble in a normal nickel plating solution than the 99 per cent anode. The reason for this is that the lower grade anode contains more carbon and iron, which accelerates corrosion. They also contain one or more per cent of tin, which increases their solubility. In hot nickel solutions, temperatures from 110° to 120° F., especially if such solutions contain up to 4 ozs. nickel chloride per gallon, the 99 per cent anode will reduce normally. Rolled nickel anodes 99½ per cent plus, when annealed dead soft, are now being used in many plants in hot solutions with maximum results.

The chlorine factor in nickel chloride aids rapid corrosion of such anodes.—C. H. P. Problem 3,402.

PICKLING BRASS CASTING

Q.—We would appreciate information on the kind of acid which it is necessary to use in order to pickle brass castings to take the sand off without injuring the casting. We do not possess a sand blast and the castings are too heavy to rattle; that is, rattling them causes them to niche each other so that they are very difficult to polish.

A.—For removing burnt-in sand from brass castings, prepare a solution consisting of water, 10 gallons; commercial hydrofluoric acid, 1 gallon. Use either a wooden tank or a wooden tank lined with sheet lead; the seams to be burned in. The most effective results are obtained when the acid solution is heated to 120° to 140° F. This will have to be done by a lead steam coil or the injection of live steam through a lead steam pipe. Hydrofluoric acid must be added to the solution when it becomes weak and does not remove the sand. If a more finished casting is required, then dip the brass castings (after removal of the sand and washing in water) in an acid dip prepared as follows: nitric acid, 1 gallon; sulphuric acid, 1 gallon; water, 1 pint; muriatic acid, 2 ozs. Wash after using this solution. Prepare the solution about 10 hours before using.—C. H. P. Problem 3,403.

PINHOLES IN BRONZE

Q.—As one of your subscribers, we should greatly appreciate having you advise on how best to eliminate a persistent recurrence of porous patches in our bearing bronze castings. We get all the time good clean castings on a mixture of 87% copper, 8% tin and 5% zinc, and with this we use about 30% remelted gun metal scrap. We do all our melting in an open flame oil furnace, and bring them to a temperature of 2000° to 2100° F. in the furnace and pour the molds, which are stove dried, at 1900° to 1950°. Our castings are largely for shaft liners and weigh from 800 lbs. to 1400 lbs. each.

The porous patches have no serious blemishes or blow holes, but are full of pin point marks. We have been using rock salt for flux in our lades, and sometimes air slacked lime or silica sand for a covering in furnace.

A.—From your letter we would say your trouble is due to improper melting. As you say your melting is done in an open flame furnace, you can check this up by seeing if your furnace is making slag. If so, increase your air pressure to about 18 ozs., your oil to about 40 lbs., and run a clean flame, one that will burn all the oil. We feel your trouble is here as the mixture you are using is a very good casting alloy. We also suggest you add about one-half percent of 15% phosphor copper to mixture. Add one-half when you charge the metal, the balance just before you pour the metal from the furnace. Salt and lime make a very good flux and I would continue their use.—W. J. R. Problem 3,404.

SAND BLASTED BRASS

Q.—We are desirous of obtaining a sand blast effect on brass escutcheons through a tumbling process. We have tumbled these escutcheons in building sand, but the result was by far too bright.

A.—We suggest that coarse pumice stone powder be used for the production of a sand-blast effect upon brass, by tumbling. Use it dry. If a brush brass tone is desired, then the pumice stone powder may be mixed with water and maplewood sawdust, and the brass escutcheons tumbled in the mixture. Try out both methods. Sand only brightens the product in tumbling, as you have learned by experience.—C. H. P. Problem 3,405.

SILVER TANK LINING

Q.—I would like to ask you for information on the lining of a silver plating tank. Our solution is plating black, and I would like to know if this is caused by too much pitch in the lining. The lining is equal parts of pitch and asphalt.

A.—Plating tanks should be lined with pitch. When in the lump it should be melted to the boiling point, and then tempered with just a very small amount of coal tar. It is best to test the mixture out by dropping in cold water. The mixture is best when the pitch can be bent perceptibly without breaking after the water test. We presume you have used too much coal tar, which is probably darkening your solution. If the mixture was purchased, then it may contain an oil that is soluble in cyanide solution. You had better remove the solution, burn out the asphaltum now applied, and apply a new mixture as outlined. You can filter out the asphaltum from the solution by passing it through a good thickness of clean white sand, preferably sea sand. Pitch is sometimes termed coal tar asphaltum.—C. H. P. Problem 3,406.

TESTING PLATING

Q.—Our present method of testing plating is not entirely satisfactory and we would ask that, if possible, you would kindly send us a practical method of testing nickel plating.

A.—We would suggest that this proposition be turned over to a consulting electro-chemist. What you actually need is a standard deposit of nickel; that is, by weight per square foot of surface area. This means not only a uniform solution condition at all times but an equally well-balanced current condition based upon amperage and time of immersion in solution. There have been no actual tests prescribed for nickel deposits. The Hocker-Farnsworth ammonium chloride intermittent test is probably the most reliable. (See article by C. J. Wernlund in THE METAL INDUSTRY for January, 1925, page 13, for details.) We would also refer you to Blum and Hogaboom's book and Bureau of Standards Circular No. 80 on Protective Metallic Coating for the Rust Proofing of Iron and Steel. This circular contains detail drawing for the salt spray unit, much used in testing nickel plated surfaces for standard deposits.—C. H. P. Problem 3,407.

TIN PLATING PERCOLATORS

Q.—We would appreciate very much to have you advise us of a method of tin plating the inside of our percolators. These percolators are drawn from sheet copper and then nickel plated.

We occasionally find a customer who complains of the metallic taste due to the inside of the pot being nickel plated and it is this objection that we should like to overcome.

A.—The following formula is used extensively in electro-tin plating such articles as the inside of percolators, etc., and for electro-tinning in general: water, 1 gallon; sodium stannate, 28 ozs.; soluble tin salt, 2 ozs.; powdered white starch, ¼ oz. A stock solution should be prepared on this basis and should be maintained at a temperature of 180° F. The solution should be placed inside the percolators and placed on a copper strip connected with the negative current factor. For anodes, use circular strips of sheet steel, which should be arranged as a permanent factor so that many percolators can be plated at the same time as one.

To keep the electro-tin solution constant, water should be added to maintain the original volume. Soluble tin salt is to be added when the solution no longer shows any precipitate of this salt on the bottom of the solution tank or container. This factor regenerates the solution. The deposit is silver white. For a lustre, scratch brush the inside of the percolators dry, using soft crimped brass wire or steel inside cup brushes. The sodium stannate and soluble tin salts can be obtained through firms advertising in THE METAL INDUSTRY.—C. H. P. Problem 3,408.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,539,629. April 28, 1925. **Method of Treating Alloys.** Norman B. Pilling, Wilkinsburg, Pa., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvania.

The method of treating alloys having a coefficient of resistance that continuously approaches zero as the material is cold-worked which comprises cold-working said material and heating to a temperature not higher than 200° C. for diminishing the resistance thereof.

1,535,743. April 28, 1925. **Process of Separating Antimony and Lead.** Burt C. Stannard, Berkeley, and Calvin W. Haffey, Selby, Calif., assignors to American Smelting and Refining Company, New York, N. Y., a corporation of New Jersey.

The process of recovering commercially pure antimony oxide directly from lead bullion containing antimony in excess of a relatively fixed percentage that forms a stable oxide of antimony in quantity in the presence of lead, which consists in melting the bullion, heating the bath under oxidizing conditions to an appropriate temperature to effect continuous volatilization of the excess antimony, and maintaining said temperature until substantially all of the excess antimony is removed from the bath as a fume.

1,535,858. April 28, 1925. **Metal and Metal Alloy for Thermoelectric Purposes in Particular for Making Thermocouples.** Wilhelm Rohn, Hanau, Germany.

The method of preparing uniform base metals and base metal alloys for use in thermocouples, which comprises degasification by melting under predetermined reduced pressures and predetermined temperatures.

1,536,858 and 1,536,859. May 5, 1925. **Electroplating Cadmium.** Chad Herbert Humphries, Kokomo, Ind., assignor to the Udylite Process Company, Kokomo, Ind.

The method of obtaining a bright, dense, coherent coating of metallic cadmium on another metal, which consists in electrodepositing cadmium from a cyanide solution in presence of a protein addition agent in quantity sufficient to produce an appreciable brightening effect but not exceeding .05%.

1,537,047. May 5, 1925. **Cadmium Plating.** Maurice E. Louth and Arthur White Young, Kokomo, Ind., assignors to Udylite Process Company, Kokomo, Ind.

Process of electroplating with cadmium, which comprises electro-depositing cadmium from a sodium cadmium cyanide bath containing from ¼ to 6 ounces of cadmium and from ¼ to 10 ounces of free sodium cyanide per gallon of bath.

1,535,542. April 28, 1925. **Non-Ferrous Alloy.** William B. Price, Waterbury, Conn., assignor to Scovill Manufacturing Company, Waterbury, Conn, a corporation of Connecticut.

An alloy comprised chiefly of copper, nickel and tin, and containing said copper, nickel and tin in proportions falling within the limits fixed by the formulæ, substantially as described, viz.:

$$\text{Copper} = y = 93.75 - 0.9\,x \pm (5.75 - 0.1\,x)$$

in which x = % of nickel and can vary between 0.5% and 33.0%,

$$\%\ \text{Sn} = 100\% - (\%\ \text{Cu} + \%\ \text{Ni}).$$

1,535,577. April 28, 1925. **Apparatus for the Electrolytic Deposition of Metals.** Arthur Harold Wyld Cleave, Ottawa, Ontario, Canada.

Improved apparatus for the electrolytic deposition of metals, comprising in combination a jar, a plurality of fixed anodes suspended in the jar, a rotary cathode, a cathode carrier adapted to rotate in a horizontal plane, means for supplying current to the anodes, means for rotating the cathode, including a vertical shaft, a cotter and slot connection between the vertical shaft and the cathode carrier, and an automatic scraper operating on the cathode as and for the purpose specified.

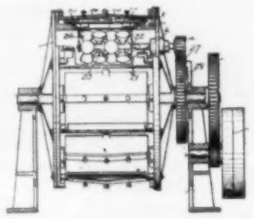
1,533,805. April 14, 1925. **Electroplating Rack.** Edd C. Oliver, Adrian, Mich., assignor to Parker Rust Proof Company, Detroit, Mich.

A rack for use in electroplating consisting of a vertically disposed member having laterally extending cross-pieces thereon, and hangers removably secured to said cross-pieces.

1,537,731. May 12, 1925. **Composite-Metal Article.** David Basch, Schenectady, N. Y., assignor to General Electric Company.

An article of manufacture comprising a foundation metal having a substantial electrolytic potential with respect to cadmium, a layer of tin thereon, and a coating of cadmium on said tin.

1,538,231. May 19, 1925. **Burnishing Barrel.** George E. Abbott, West Hartford, Conn., assignor to The Abbott Ball Company, West Hartford, Conn.



A receptacle having an opening therein for the reception of articles to be burnished, a work holder support closing said opening, a work holder mounted upon said support within the receptacle, means for causing relative movement between said holder and said receptacle and burnishing material within the receptacle, said holder including means to removably receive articles to be burnished.

1,538,246. May 19, 1925. **Metallic Composition.** Edwin F. Kingsbury, Rutherford, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y.

A metallic composition comprising as the essential elements thereof the following metals in substantially the following proportions, silver 10 to 50 per cent, tin 1½ to 5 per cent, and copper 45 to 88 per cent.

1,538,355. May 19, 1925. **Powder for the Autogenous Soldering or Welding of Aluminum.** Pio Rossi, Berne, Switzerland.

A powder for the autogenous soldering or welding of aluminum, comprising a mixture of a small amount of chloride of sodium and a large amount of chloride of potassium, and a fluoride mixture consisting of equal parts of fluoride of aluminum and cryolite and representing at least 35 per cent of the total mixture.

1,538,792. May 19, 1925. **Process for Treating the Surface of Bronze, Brass and Like Metals.** Richard William Henry Fox, Palmers Green, England.

A process for treating bronze, brass and the like metals to produce a protective coat thereon, the appearance of which can be varied, said process consisting in abrading the metal surface to remove the unsightly products of corrosion and to expose the patina-like surface covering the unacted upon metal, then covering such patina-like surface with a coloring material of the class known as "bronze," removing the superfluous part of such coloring material, and then applying celluloid varnish and a wax coating.

1,539,260. May 26, 1925. **Acid-Resistant Alloy.** Charles B. Jacobs, Wilmington, Del., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del.

A copper-base alloy in which the copper is combined with sufficient silicon to form an alloy that is more resistant to acids than is pure copper, said alloy also containing a sufficient amount of manganese to render the alloy machinable.

1,539,577. May 26, 1925. **Process for Electroplating Metal Goods.** Felix Kirschner, Vienna, Austria.

The herein described process of improving the character of an electrolytically deposited coating of a comparatively easy fusible metal on a less easily fusible ground metal which consists in smelting the coating under the cooperation of an adhesion flux, and in artificially cooling the ground metal and the coating while the coating is still in molten condition, whereby the molten coating sets completely during the cooling operation.

1,539,691. May 26, 1925. **Centrifugal Casting Machine.** Benjamin Noble, Detroit, Mich., assignor to Capitol Brass Works, Detroit, Mich.

In a casting machine, a mold body, a mold shell detachably mounted in said body, an ejector extending into said mold shell and forming the bottom of a mold cavity in said shell, an air valve communicating with said mold shell and adapted to admit air to said mold shell, for cooling and cleaning purposes, and means adapted to simultaneously adjust said air valve and said ejector.

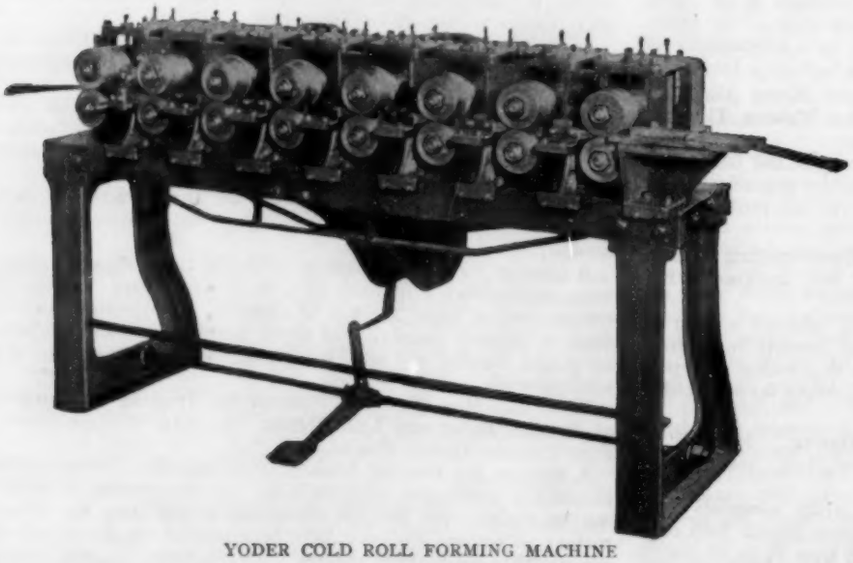
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

COLD ROLL FORMING MACHINE

The Yoder Company of Cleveland, Ohio, has recently placed on the market a new type of cold roll forming machine, for rolling strip metal into a great variety of shapes, some of them exceedingly intricate. This machine is built in various sizes, with 4 to 12 pairs of rolls depending on the section to be formed and the intricacy of the design. It is intended for rolling steel, brass, copper or zinc into almost any shape that can be formed on a draw bench, press or brake and at a very much greater speed than the material can be formed in any other way. The machine is built on a very substantial base, with large mandrels and overhung rolls; the boxes bronze bushed and the machine can be equipped either for belt or direct motor drive.

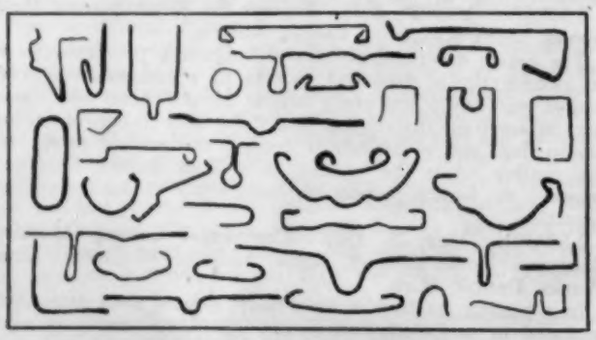
In some cases the speed at which the material passes through



YODER COLD ROLL FORMING MACHINE

these machines is as high as 210 feet per minute, but the speed depends almost entirely on the sort of material to be rolled and the character of the section to be formed. Plain sections from light material can be run as high as 210 feet but heavier sections down to 75 or 100 feet per minute. Many sections can be run on these machines as high as 75,000 or 80,000 feet per day.

Sections for weatherstrip, beading, automobile molding and trim, small angles, channels, butt seam tubing or any section of ordinary form, can be rolled on these machines either in steel, brass, copper, aluminum, duralumin or other alloys, greatly reducing the cost of manufacture and enabling the manufacturer to



SHAPES FORMED ON YODER MACHINE

produce strips of indefinite length, which is often highly advantageous, particularly if long lengths of material are required. Ordinarily on a draw bench from 12 to 20 feet is the limit that can be produced, while on rolling machines of this character strips up to 100 feet in length can be produced if desired.

Below are some illustrations of sections rolled on these machines. These sections are half size and will give an idea of the production of these machines.

TESTS OF OIL BURNERS

The Hauck Manufacturing Company of Brooklyn, N. Y., has issued copies of two very interesting reports on the operation of its Venturi low pressure oil burners. These reports were made by the A. C. Nielsen Company, engineers of Chicago, Ill. Summaries of these tests are given as follows:

CORE OVEN IN A LARGE EASTERN FOUNDRY

1. Hauck Venturi low pressure burners replaced coke burning equipment on 31 core ovens.
2. Equipment requires only small space.
3. Very few changes in furnace construction required.
4. Oil supply is controlled by automatic regulators.
5. Small pumps keep oil circulating and prevent any clogging.
6. Burners operating on 30 to 28 degrees Baume oil without preheating.
7. Burners light readily even with cold furnace and there have been no explosions or back firing.
8. Use oil pressure of 15 lbs. and air pressure of 16 ozs.
9. Temperature easily and accurately controlled.
10. Temperature uniform throughout oven.
11. Fuel consumption averages .6 gallon per 100 lbs. cores treated. Cost, $.037.
12. Total heating cost less than $.05 per 100 lbs. cores treated.
13. Ovens down two days are brought up to normal operating heat in 20 minutes. With coke it took 6 hours.
14. Total net saving in labor and maintenance costs is $17,959.31 a year.
15. Regular production of core ovens increased 25 per cent.

CORE OVENS AT MILWAUKEE STEEL FOUNDRY COMPANY

1. Oil pre-heated by heat from oven.
2. Constant oil and air pressure maintained.
3. Great variety of work done.
4. Cores baked at 400 degrees.
5. Temperature can be accurately controlled.
6. 31½ gallons of oil for 40 tons of sand cores.
7. Better cores produced.
8. Negligible maintenance cost.
9. Run full load for $2.23 a day.
10. Cost 5.6c per ton of cores baked.

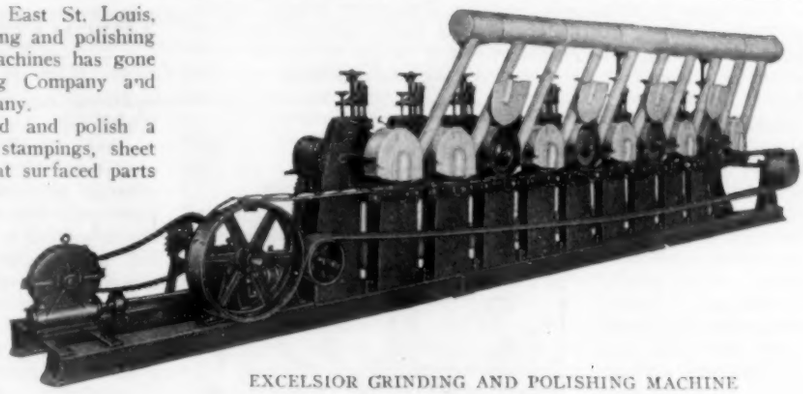
STUTZ POLISHING LATHE

In our issue of March, 1925, on page 121, was published a description of the Stutz Polishing Lathe, with the statement that this lathe was made by the George A. Stutz Manufacturing Company of Chicago, Ill. This statement was not quite accurate, as the machine is being manufactured in the shop of the Wm. Scott Manufacturing Company of Chicago, and is being sold exclusively through the George A. Stutz Manufacturing Company. Its design is the result of collaboration between George A. Stutz, Walter H. Scott, of the above companies, and Joseph F. Miller, foreman of the Rama Spring Bumper Bar Company, of Chicago, Ill.

GRINDING AND POLISHING MACHINE

The Excelsior Tool & Machine Company of East St. Louis, Ill., has put out a new multiple automatic grinding and polishing machine of ten wheel capacity. One of these machines has gone to the Westinghouse Electric & Manufacturing Company and another to the Edison Electric Appliance Company.

The machine is designed and built to grind and polish a variety of articles, such as castings, forgings, stampings, sheet metal strips, angle iron, or other straight and flat surfaced parts of uniform thickness which can be placed on the conveyor belt and carried under the grinding and polishing wheels at an approximate feed rate of 25 feet or more per minute in accordance to the requirements and within the capacity of this machine.



EXCELSIOR GRINDING AND POLISHING MACHINE

The ball bearing wheel spindles are directly connected to 7½ horse power motors mounted on vertical self-contained sliding frames which are from 12″ to 16″ in diameter. Wheel spindle end diameter 1¾″. Solid abrasive wheel capacity 14″ or less. Polishing wheel 16″ or less; speed 1,800 R.P.M.

Machines are built in the following sizes and width: 5″ width of wheel requires 8″ feed belt with 8″ feed tables; 8″ width of wheel requires 10″ feed belt with 10″ feed tables; 3 wheel machine—weight 11,000 lbs.; 6 wheel machine—weight 17,000 lbs.; 10 wheel machine—weight 23,000 lbs.

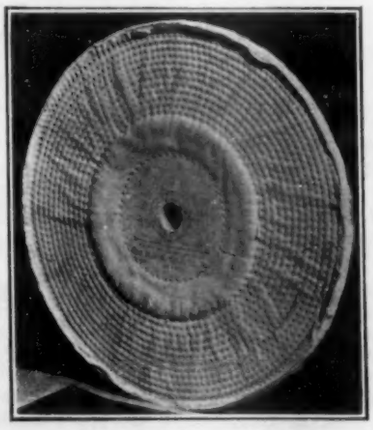
The bearings have ample oiling facilities; are dust proof, and easily lubricated. Each wheel can be dressed without removing them from the spindles or stopping the machine, in the usual way by the use of a rotating dresser, sliding same on a wedge set parallel to the wheel; this wedge is fed in forcing the dressing tool against the wheel. The wheel dresser, wedge and rests are furnished for this purpose with each machine.

Adjustments on top of the vertical sliding housing adjust the wheel to a fixed height from the grinding wheel to the top of the conveying belt; also any pressure can be applied to the wheel by the adjustment mentioned. The wheels are always free to follow a slight irregularity if this is required, and are always free to raise clear of any obstruction, should this arise by the accidental insertion of material too thick to pass freely under the wheels or doubling up during the grinding operation. All possible chances of damage to this machine have been eliminated.

NEW TYPE SEWED BUFF

A new type sewed buff—the Biasplex—is just announced by the Bias Buff & Wheel Company. Like the Bias Buff, the Biasplex incorporates the Bias principle with certain modifications and changes desirable in a full sewed wheel.

The result is a hard, extra fast cutting wheel that can be used to advantage on any work where a pieced buff or a whole layer sewed buff is now used. The standard Biasplex is made 30 ply, in either bleached or unbleached sheeting. For most work, the unbleached is recommended. The goods used in the buff are manufactured in the company's own mills at Ware Shoals, S. C., and Trion, Ga.



BIASPLEX BUFF

Incorporating as it does the Bias principle, it is claimed that the Biasplex in unbleached sheeting possesses a much faster cut than the ordinary sewed buff in bleached goods.

5 sections Biasplex makes a 2¼″ face.

5 sections whole layer sewed make 1″ face.

5 sections pieced buff make 1½″ face (average).

It is difficult, of course, to make an exact comparison between the Biasplex and a sewed pieced buff because the latter seldom runs uniformly, as some manufacturers make a thick pieced buff and some a thin section. Therefore, the comparison above, while accurate as far as it refers to a whole layer sewed buff, is approximate as compared to a pieced buff.

The makers of the Biasplex emphasize the fact that their own buff is not a pieced buff, and for that reason it is accurately balanced and uniform in quality; in fact, there can be no variation in either weight or quality, all sections being identical.

It is stated that the cost of a Biasplex wheel is as low, or lower than either a pieced or whole layer wheel, and that on account of the patented Bias principle, it will last 25% to 50% longer than the old type of sewed buff.

Some months ago, the Bias Buff & Wheel Company announced it would guarantee to users of the Bias buff a saving of at least 15% over the cost of doing the same work with a loose leaf buff. It will continue this policy with the Biasplex, and guarantees in writing a minimum saving of 15% over and above the cost of doing the same work with either a pieced or whole disc sewed buff. This policy of guaranteeing a definite saving has been an important factor in making the sales of Bias buffs increase over 400% in the last six months.

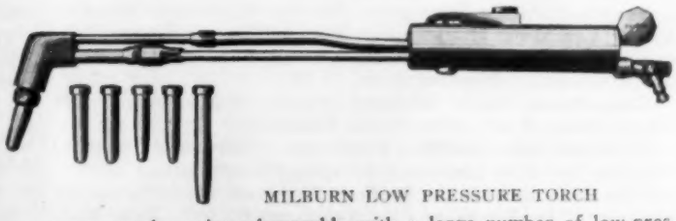
The Bias Buff & Wheel Company, Inc., is now in new quarters, 342 Madison Avenue, New York City.

CUTTING AND WELDING TORCH

This is a low-pressure torch, which will operate on either low pressure or high pressure gas with equal efficiency. It is especially constructed to operate with low-pressure acetylene gas, city gas or hydrogen. It is recommended for use with a low-pressure acetylene generator.

This torch is said to be very efficient, utilizing the parts of the Milburn cutting and welding torches, and to insure a correct and intimate mixture of the oxygen and acetylene resulting in "super mixing" and non-flashback qualities. It is adapted to perform welding as well as cutting work by the simple interchange of the necessary tips.

The torch is of bronze forgings and special seamless tubing, constructed to stand constant service. The tips are made of solid copper and are interchangeable with a large number of low-pressure torches of other makes. It is made by the Alexander Milburn Company, Baltimore, Md.



MILBURN LOW PRESSURE TORCH

SPRAY EQUIPMENT

The Spray Painting and Finishing Equipment Sales Company, of Boston, Mass., distributors for the Spray Engineering Company of that city, have on the market a variety of lacquer equipment for automobile painting. Among their products are the model 14-A Spraco lacquer gun, illustration of which is shown below; Form "P-6" equipment for larger work; air compressors; air regulating set; complete air compressor units; gravity feed type of lacquer equipment; pneumatic compressor feed type of equipment and exhaust fans.

SPRACO LACQUER GUM

The lacquer gun illustrated has, it is stated, the following special advantages:

1. Adjustable spreader, giving fan spray of controlled width in any plane.
2. Positive nozzle shut-off, no "spitting" or leaking after release of trigger. Partial pull of trigger admits air only for dusting or drying off work.
3. Ease of cleaning and care, shortest possible fluid passage.
4. Needle and nozzle only parts in contact with the paint.
5. Light trigger pull and two-finger trigger.
6. Interchangeable quart or pint aluminum material containers.
7. Containers instantly attached or detached with bayonet lock, no sticking or leaking.
8. Universal; container may be detached and gun used on either pressure or gravity feed equipments.

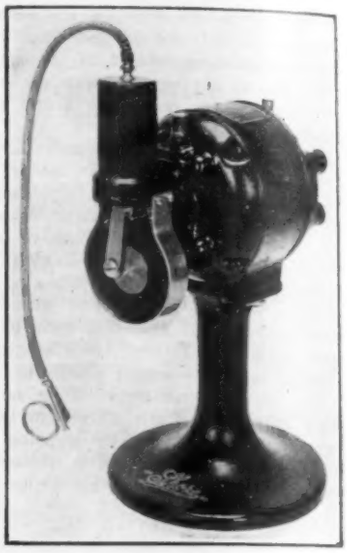
NON-INFLAMMABLE LACQUERS

The Williamsburg Chemical Company, Inc., 230 Morgan avenue, Brooklyn, N. Y., has placed on the market a line of non-inflammable nitro-cellulose lacquers and lacquer enamels. They are said to be of the highest grade and have the quality of being adhesive, hard and flexible.

It is stated that they are not more expensive than equal grades of inflammable lacquers. They can be shipped and stored without restriction, thereby lessening the fire hazard and insurance rate.

AUTOMATIC ACTUATOR FOR SCLEROSCOPE

In many mass production operations, the scleroscope is operated continuously throughout the work day and during which time the operator is required to make several thousands of tests. Such continuity of effort is often fatiguing to the operator, unless a change of activity is provided, hence there has developed a demand for an auxiliary actuating device which relieves the operator of muscular effort, except merely that of pressing a small trigger.



SHORE AUTOMATIC SCLEROSCOPE ACTUATOR

An electric pneumatic machine designed for this purpose is shown in the illustration. The electric machine keeps going continuously. It has the same suction and comprehensive force as the operator would have with the usual rubber bulb. It also runs at a speed which is correct for operating the scleroscope as in ordinary service.

By this arrangement, a succession of tests can be made without the use of the trigger, except to hold it drawn in, making air connections with the motor. This enables the operator to pass the scleroscope over a surface to be tested in order to obtain a quick determination of uniformity, or the average hardness, which is very important. The timing for drawing up the hammer, release and rebound, is done automatically by the use of the slow speed motor employed, and is so calculated that following each rebound the hammer is drawn up before it can fall back on the test specimen the second time. This, it is claimed, serves to effect a material saving in hammer wear, as well as in the operator's time.

The machine is made by the Shore Instrument & Manufacturing Company, Jamaica, N. Y.

EQUIPMENT AND SUPPLY CATALOGS

Gas Burners. Nimrod, Ltd., London, England.

Electrical Recording Instruments. Bristol Company, Waterbury, Conn.

Blower Salesmen's Convention. American Blower Company, Detroit, Mich.

Copper Outlook and Investment Review. D. Houston and Company, New York.

Recording Thermometers Gas Filled. The Bristol Company, Waterbury, Conn.

How Science Speeds Up Metal Cleaning. Cowles Detergent Company, Lockport, N. Y.

Electrical Power Apparatus. Electric Machinery Manufacturing Company, Minneapolis, Minn.

Electric Cranes and Hoists. Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.

Chase Brass. Light talks and cartoons on a serious subject. Chase Metal Works, Waterbury, Conn.

Merchandising Foundry Products. (Sales and Service.) Metropolitan Life Insurance Company, New York.

"The Man Behind the Business." A talk on industrial insurance. The Equitable Life Assurance Society, New York.

A. J. Lindemann. Tribute on his 50th year in the stove industry. A. J. Lindemann & Hoverson Company, Milwaukee, Wis.

Everdur No. 50 Metal. Physical and Corrosion Resistant Properties of this metal. Du Pont Everdur Company, Inc., Wilmington, Del.

Serving the Metal Stamping Industry. A 12-page bulletin upon the manufacture of die sets. Danly Machine Specialties, Inc., Chicago, Ill.

Report of Evaporating Tests on Boiler No. 1 Power House No. 1, River Rouge plant of the Ford Motor Company. Combustion Engineering Corporation, New York.

Twenty-five Years of Printing. A handsomely illustrated historical booklet on the twenty-fifth anniversary of The Technical Press, the establishment which prints THE METAL INDUSTRY.

Year Book of the New York Electrical Society for 1925. Laboratory and Workshop Appliances for Chemists, Assayers, Jewelers, Laboratories, Workshops and Tool Rooms. Buffalo Dental Manufacturing Company, Buffalo, N. Y.

History of the League for Industrial Rights. This booklet contains material concerning the part the League has played in the legal and political phases of our industrial life during the last twenty years. Published by League for Industrial Rights, New York.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 SOUTH DEARBORN STREET, CHICAGO, ILL.

FOUNDRY DEVICE COMPETITION

The American Foundrymen's Association has organized a competition for foundry workers for the Syracuse meeting which is to be held October 5-9, 1925. This competition provides for a prize, known as the S. Obermayer Award, and will be given to the foundryman who submits the best idea for a foundry jig or a device which can be used for the purpose of increasing the production of castings or facilitating the handling of equipment. Any jig, piece of equipment, or description of a method that can be used in molding, making castings, or in handling operations, will be acceptable. This competition is made possible by a fund contributed in 1920 by the S. Obermayer Company of Chicago, Ill.

A condition is that entries must be in the hands of the judges thirty days in advance of the convention date. Those wishing to compete should, as soon as possible, inform the Secretary of the American Foundrymen's Association.

TECHNICAL PROGRAM

Fourteen technical sessions have been planned. This has been made necessary because of the increasing divisions of foundry work which are being given attention by investigators and writers. Also, the program committee has kept in mind to so arrange the meetings that those who plan to stay only a couple of days can choose a time when technical sessions in which they are most interested are grouped. Meetings will be held at the State Fair Grounds, where the Convention Headquarters will be located.

Monday, October 5, Afternoon Sessions
Joint Opening Session
Non-ferrous Metals
Tuesday, October 6, Morning Sessions
Aluminum Alloys
Luncheon Round Table Discussion
Brass Foundry Topics
Afternoon Sessions
Apprentice Training
Refractories
Wednesday, October 7, Morning Sessions
General Committee Reports
Afternoon Sessions
Business Session
Sand Control and Research
Afternoon Session
Sand Control

The report of the work of the foundry sand investigation committee will be of interest to all foundrymen, for new developments will be discussed. Since the Milwaukee meeting, many of the largest foundries of the country have undertaken sand control testing and the benefits to be derived from such work will be discussed from a practical standpoint. Two new committees of the sand research committee will have preliminary reports to make. These reports will be those of the Sub-Committee on Grading, and the Sub-Committee on Core Tests. The sub-committee on grading will discuss the possibility of establishing standard specifications for grading and buying sands. The need for such standards has been felt for a long time and the results the committee hopes to accomplish will lead to the use of specifications in buying sands.

The sub-committee on core tests is investigating the possibility of establishing methods of testing the core sand mixtures, similar to tests developed for molding sands. The committee on foundry refractories is developing a discussion session where problems peculiar to each phase of the foundry practice will be given prominence. A pamphlet listing live refractory questions is to be distributed and solutions will be discussed at this meeting.

On Tuesday, October 6, a luncheon will be held for those interested in brass foundry shop problems. After the luncheon an informal discussion on practical shop problems will be held. This meeting is especially for shop foremen and each will be given a chance to contribute to the discussions. No report of the discussions will be kept, as it is desired to have all feel especially free to express his views.

Apprentice training will again be taken up at an open meeting at which time methods of carrying on training in the smaller plants and unorganized groups will be explained. The committee desires to give the greatest publicity to apprentice training, as it is felt that it is one of the greatest needs of the foundry industry at the present time.

FOUNDRY EXCHANGE PAPERS FOR 1925

Two French exchange papers will be presented on the behalf of the Association Technique de Fonderie de France. The paper devoted to metals will be by R. de Fleury on "Aluminum Alloys and their Casting Peculiarities."

Dr. H. Ries of Cornell, has prepared the fifth annual American Foundrymen's Association exchange paper which will be presented at the June meeting of the Institute of British Foundrymen. G. H. Clamer, past president of the American Foundrymen's Association, will present the 1925 annual American Foundrymen's Association exchange paper before the Fall meeting of the French Foundry Association.

THE SUMMER MEETING OF THE NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

HADQUARTERS, CITY HALL SQUARE BUILDING, CHICAGO, ILL.

The National Association of Brass Manufacturers concluded a highly successful and satisfactory Summer Meeting at the Edgewater Beach Hotel, Chicago, Ill., on Thurdsay afternoon, June 11. Among the guests that were present were: J. L. Mott Iron Works; Milwaukee Flush Valve Company; Street & Kent Manufacturing Company; Union Brass & Metal Company; Capitol Brass Works; Baltimore Valve Corporation; Roberts Brass Manufacturing Company.

At the opening of the session, the Baltimore Valve Corporation of Baltimore, Md., represented by its Vice-President, Julian H. Marshall, and the Roberts Brass Manufacturing Company, Detroit, Mich., represented by Mr. Earl William Roberts, were elected to membership.

One of the more important things the Association did was the adoption of a color scheme, whereby all hot water faucets of indexed type will, in the future, be wrapped in red paper which will indicate "Hot Water," while the cold water faucets will be wrapped in a lighter color, yellow or light grey paper, the advantage being obvious. It eliminates unpacking or unwrapping the goods to ascertain which is hot and which is cold. In many cases the goods are not properly recovered or rewrapped, with the result that they become dingy. Furthermore, frequent mistakes are made and contractors getting goods at place of installation receive two faucets that are for hot water or two for cold water. But the more important feature is the time saving to the manufacturer, the jobber, the plumber or contractor, so that they may know at a glance in removing the cover of the box or carton which is cold and which is hot.

A treatise on the right and wrong way of handling, installing and caring for plumbing goods was presented in a compact booklet form with illustrations in colors, which instructs the housewife to use soap and hot water in caring for nickel work or possibly kerosene or gasoline, but to avoid all materials having emery, pumice or gritty substances; same should be treated in a like manner that the silver ware on the table is cared for, and in a similar form, china handles, china tubs and lavatories should be treated the same as the china ware of the home. It is the purpose of the Association to get these booklets up in quantities to supply to the trade, and the house owner.

Reports as to general business conditions and future outlook

in various sections, secured from members and tabulated by Commissioner Webster and distributed at the meeting, were of a favorable nature.

Various other committee reports were received, and the Commissioner urged the members to make use of the Research Committee, who will gladly answer any requests for information as to modern methods on foundry or shop equipment, metal mixtures or economy in production and distribution, which will be of great value to all members of the Association.

The meeting adjourned to meet in Cleveland, Ohio, on September 9 and 10, 1925.

WASTE MATERIAL DEALERS

HEADQUARTERS, TIMES BUILDING, NEW YORK

MEETING OF THE METAL DIVISION

A well attended meeting of the Metal Division was held on Wednesday afternoon, at the Congress Hotel, Chicago, and at this meeting the principal subject for discussion was the report made by the committee having in charge the revision of the metal classification, which committee met at Association Headquarters, New York, on May 5. The report of the committee and the suggested changes were approved by the Board of Directors, after taking into consideration suggestions made at the meeting of the Metal Division in Chicago. A new classification will be effective as of July 1, and will shortly be distributed to members.

The principal changes will be in heavy yellow brass; yellow brass castings; No. 1 red composition turnings, and No. 1 yellow rod brass turnings. The new classification will also contain a note reading as follows:

"When material is such that it can be sorted by hand, consignees cannot reject the entire shipment if the percentage of rejection does not exceed ten per cent (10%). The disposition of the rejected material should then be adjusted by negotiation. No replacement of the rejected material to be made."

NEW YORK METAL DEALERS MUST TAKE OUT LICENSE

The Court of Special Sessions, County of New York, Appellate Term, has affirmed the conviction found by the lower court, by which Birenbaum Bros. & Sack were fined for not having a junk dealer's license.

A group of twenty of the metal dealers hired an attorney and took the case to the higher court, but without getting the decision of the lower court reversed. This means that unless the matter is taken to the Supreme Court; or unless it is possible to get the ordinance changed, any metal dealer whether retail or wholesale, may find it necessary to take out a license and conform to the requirements which licensed dealers are expected to observe.

It has not yet been decided whether to appeal the case, or to simply try to get the ordinance changed.

NEW YORK BRANCH, A. E. S.

HEADQUARTERS, CARE OF E. L. TANNERT, 2256 WATERBURY AVENUE, NEW YORK

The June meetings of the New York branch of the American Electro-Platers' Society were well attended. President William Fisher presided.

After a lengthy discussion, it was decided to continue meeting all through the summer months for the benefit of those who may wish to attend. It was also decided to run an outing in the month of August, 1925, as a sort of family gathering where the members could bring their wives and children or sweethearts along and spend a pleasant day. Exact date and place will be decided upon at the next meeting when the committee brings in reports.

Mr. Fisher presented samples of mahogany finish on iron castings and tubing applied by the spray process. Discussions followed and Mr. Fisher received a hearty vote of thanks.

BRITISH INSTITUTE OF METALS

HEADQUARTERS, 36 VICTORIA STREET, S. W. 1, LONDON, ENGLAND

The Annual Autumn Meeting of the British Institute of Metals will take place in Glasgow from September 1-4, 1925. A Reception Committee will be presided over by Lord Weir of Eastwood. It is expected that the meeting, which is the first to be held in Glasgow for fifteen years, will attract a large attendance, including that of many visitors from overseas who may be in this country in connection with the British Empire Exhibition.

On the evening of September 1 the Fourth Annual Autumn Lecture will be delivered by Sir John Dewrance, Vice-President.

On September 2 the morning will be devoted to the reading and discussion of papers. Afterwards members and their ladies will be entertained at luncheon by the Reception Committee and members of the Scottish Local Section. The afternoon will be devoted to visiting four or five of the leading engineering works. In the evening there will be a reception by the Lord Provost and Magistrates in the Municipal Buildings, to which also will be invited representatives from kindred technical societies in Glasgow.

On the morning of September 4, further papers will be presented for discussion, the afternoon being devoted to a sail down the River Clyde to view the industrial section of the river. In the evening a concert will be held in the Grosvenor Restaurant.

On Friday, September 4, there will be an all-day tour visiting Loch Lomond, Loch Katrine and the Trossachs.

Personals

E. J. MUSICK

E. J. Musick, the new supreme president of the American Electro-Platers' Society, was born in St. Louis, July 20, 1883. He was educated in the St. Louis public schools and graduated in 1902 from Manual Training School of the Washington University.

Mr. Musick entered the plating industry by donning overalls and beginning work as a helper in the plating plant of his father, the late W. H. Musick. This business had been established in 1879 by W. H. Musick and M. D. Degge, and carried on general foundry work as well as nickel plating stove castings for most of the large concerns in St. Louis, and Quincy, Ill. In 1912 E. J. Musick became a partner to his father.

E. J. MUSICK

In 1919, two years before the death of W. H. Musick, the partnership was changed to a corporation and it was decided to run the business on the co-operative plan. The foreman of the plating, polishing, lacquering and receiving departments became stockholders and assumed complete responsibility for their particular departments. The results of this policy have been very satisfactory.

At the present time, E. J. Musick is president of the Musick Plating Works, one of the largest and best equipped plating shops in the country. He is a director of the St. Louis Rotary Club and a member of 17 organizations in all. He is one of the leading spirits in the American Electro-Platers' Society, having been appointed chairman of almost all of the committees of the St. Louis branch since it received its charter in 1909. He was president of that branch in 1914-1915 and 1925-1926. He has been a delegate to every convention of the American Electro-Platers' Society, but one, which he was forced to miss because of the pressure of business. In 1923-1924 Mr. Musick held the office of supreme vice-president, and in 1924-1925 he was supreme secretary-treasurer of the American Electro-Platers' Society.

Fred Runge, formerly with the Ferro Enameling Company of Cleveland, Ohio, is now with the Andes Range & Furnace Corporation, Geneva, New York.

Clyde Thomas, formerly with Findlay Brothers Company of Canada will run the Beach Enameling plant of Ottawa, Canada, which has just completed installing a new porcelain enameling department.

The degree of Doctor of Science was conferred on **Robert J. Anderson,** consulting metallurgical engineer, Cleveland, Ohio, and Pittsburgh, Pa., by the Massachusetts Institute of Technology, Boston, Mass., at the recent commencement on June 16, 1925,

E. R. Armstrong has been transferred from the engineering department of E. I. Du Pont de Nemours & Company, Wilmington, Del., where he was in charge of the mechanical experimental department, to the Du Pont Everdur Company, Wilmington, as sales manager.

Frederick Breitenfeld, mechanical engineer and counselor at law, announces the opening of an office at 41 Park Row, New York City, for the practice of patent law, including trademark, copyright and unfair competition cases. He has done considerable work on electro-plating patents.

Charles H. Norton, consulting engineer of the Norton Company, Worcester, Mass., was awarded the John Scott medal "for the invention of accurate grinding devices of high power," at the commencement exercises of the University of Pennsylvania, Philadelphia, Pa., June 17, 1925.

Henry F. Russell has been appointed sales manager of the Sumet Corporation, 1543 Fillmore avenue, Buffalo, N. Y., manufacturer of a wide range of cored and solid bars cast from Sumet bronze bearing metal. Mr. Russell was formerly with the Lumen Bearing Company, of Buffalo, N. Y.

Joseph A. Hiross, research chemist, has resigned from the Hanson & Van Winkle Company, Newark, N. J., in order to take charge of a modern and up-to-date nickel plating room in which 3,000 gallons of high speed nickel solution are being operated at the Sheldon Axle & Spring Company, Wilkes-Barre, Pa. This firm is manufacturing a rust-proof bumper.

George A. Drysdale has become associated with the Metal Improvement Company, Cleveland, Ohio, as metallurgical engineer, having resigned as metallurgical editor of the foundry. Mr. Drysdale has had 27 years' experience in practical foundry and metallurgical work. After graduating from McGill University, Montreal, Canada, in 1898, later receiving the degree of Master of Science, he was successively chemist, metallurgist and research director for a number of companies. He became metallurgical editor of the Foundry February 1, 1924.

C. A. Parliament is now connected with the Williams Alloy Products Company, Chicago, Ill., manufacturer of bronze alloy piston rings, aluminum alloy pistons and a complete line of babbitt and bushings, as vice-president. Mr. Parliament was formerly purchasing agent of the Chicago Hardware Foundry Company, North Chicago, Ill., having been with that company eleven years.

Gunner R. Lundane, formerly manager of the New York office of The Black & Decker Manufacturing Company, has resigned to join the United States Electrical Tool Company of Cincinnati, Ohio. Mr. Lundane will act as special eastern representative and will make his headquarters at the New York office of the United States Electrical Tool Company at 50 Church street, New York City.

R. R. Clarke of the General Electric Company foundries in Reading, Pa., gave an interesting and practical talk at the dinner and meeting of the Philadelphia Foundrymen's Association on June 10, 1925, on the subject of the Foundry Physicist. In this informal address, he gave an illustrated discussion of the practical applications of physical laws to molding and to foundry work in general.

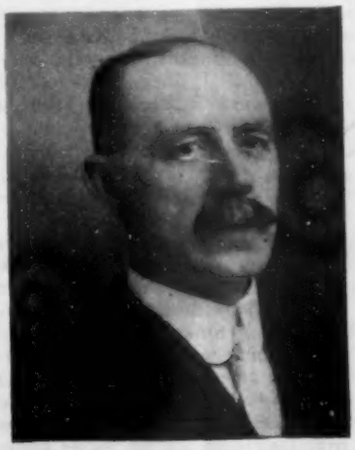
At a meeting of the directors of the **Stotter Metal Company** of Cleveland, Ohio, **James MacNee, Jr.,** of the **Balbach Smelting & Refining Company** of Newark, N. J., and New York, was elected a director and secretary and treasurer. Mr. MacNee will represent the Balbach interests in the working arrangement which has been completed between the Stotter Metal Company and the Balbach Company. During the continuance of this arrangement, the Stotter Metal Company will act as middle western representative of the Balbach Company, carrying a complete stock of the Balbach products.

William K. Frank, who was elected president of the Pittsburgh Foundrymen's Association at its last meeting, is vice-president and general manager of the Damascus Bronze Company, Pittsburgh. Mr. Frank has been identified with that company since 1911, just after graduating from Cornell University. He started as chemist and since has moved through the various departments to his present position. He is a son of Isaac W. Frank, chairman United Engineering and Foundry Company, Pittsburgh, who was one of the founders and an early president of the Pittsburgh Foundrymen's Association.

Obituaries

GEORGE WESTERMAN

On June 7, 1925, George Westerman, of Torrington, Connecticut, passed away, at the Hartford Hospital, in his 64th year.



GEORGE WESTERMAN

Mr. Westerman was born in Sheffield, England, in 1861, coming to this country with his parents in 1872. He worked as a pocketknife cutler until 1883, when he entered the Wesleyan Academy at Wilbraham, Mass., studying there until 1885. He was then employed by the Coe Brass Company of Torrington (now the Torrington Branch of the American Brass Company), remaining there until the time of his decease, or about forty years. He was foreman in the wire department and was considered an expert on shaped wire. He was a member and trustee of the Methodist Episcopal Church and was very active in Young Men's Christian Association work in this city.

He is survived by one son, three daughters, one granddaughter, five sisters and four brothers, one of whom is William Westerman, manufacturing manager of the Michigan Copper & Brass Company, Detroit, Mich.

One of the vice-presidents of the American Brass Company, said: "No one can take the place of George Westerman in our hearts." Those who worked with him both honored and loved him. The Torrington Methodist Church, of which he was for years an earnest, devoted and beloved member owes much of its worth to the community to his untiring loyalty. When men in the city of Torrington seek for an example of love, true neighborliness, honest and skilful workmanship and Christian faith that was tried by long suffering, they will remember George Westerman.

CORYDEN P. KARR

Coryden P. Karr, associate physicist of the Bureau of Standards in Washington, D. C., died in that city, in June, 1925.

Mr. Karr was born in Buffalo, N. Y., and was educated in the schools of that city, graduating from the Central High School. He obtained a degree as a engineer at the School of Mines, Columbia University, New York. His first job was that of assistant night editor on the Buffalo Express, but he left that shortly to return to New York to work in a small

brass foundry on Centre street. He left New York to open up a foundry of his own in Newark, N. J., and this enterprise prospered, but after a few years, his health broke down and he had to give it up.

After his recovery, Mr. Karr was engaged as assistant engineer on the new Croton Acqueduct where he remained for almost seven years. He then went into architectural engineering and participated in the design of such structures as the Battle Monument at Trenton, N. J., the Soldiers and Sailors Monument at Prospect Park, Brooklyn, the Grand Monument, New York, and various structural steel, roof trusses and foundations for some of the prominent architects of New York.

CORYDEN P. KARR

He then went to Boston to the Walworth Manufacturing Company, to become chief metallurgist, and from there to the Standard Sanitary Manufacturing Company, to become foreman of the large brass foundry. In Pittsburgh, Pa., he was engaged in special research work for the Standard Chemical Company and then went to Washington, to the Bureau of Standards to take charge of the brass and bronze foundry of that institution. He remained with the Bureau until about a year ago when he was stricken with the illness from which he never recovered.

Mr. Karr was a frequent and valued contributor to THE METAL INDUSTRY and was widely and favorably known throughout the metal field. He was a member of the Institute of Metals, the American Chemical Society, the American Electrochemical Society, the American Society for Testing Materials, and the British Institute of Metals. Not only his family and friends, but the acquaintances, whom he made personally and through his writings in his professional career, will mourn his loss.

JOHN A. STEVENS

John A. Stevens, formerly vice-president of the National Lead Company, died recently at his home, 318 Westminster Road, Brooklyn. He retired from active business ten years ago, having been vice-president of the National Lead Company from the time of its organization until 1904, and later he was vice-president of the United Lead and the Matheson Lead companies. He was a native of West Newfield, Mass.

GEORGE G. BOOTH

George G. Booth died suddenly on May 9 at his home in Baltimore, Md., from heart disease. He was vice-president of Diez & Roemer Brass Company of that city. Mr. Booth is survived by his wife and one son.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

JULY 1, 1925.

Work will be started immediately on an addition to the **French Manufacturing Company's** plant on Robbins street, it was announced, last week. The estimated cost of the new structure is over $100,000 and it is expected that the addition will practically double the present size of the plant. The addition will complete the second unit of the factory and result in adding over 100 more employees to the working force of the concern. At present, the existing factory is working 24 hours a day. The new building was designed by **William E. Hunt** and the builder is the **Torrington Building Company.**

The French Manufacturing Comany was started in 1906, manufacturing brass tubing in small sizes, its officers being **Frederick W. French, L. R. Carter, Harris Rathbun** and **Leon H. French.** The earlier wooden factory building was abandoned for the present brick structure a few years later. The present officers are: President, **Frederick W. French;** treasurer, **L. R. Carter;** secretary, **L. Russell Carter;** assistant secretary, **Harris Rathbun,** and superintendent and assistant treasurer, **Leon H. French.** It now employs 250 people and it has become noted for drawing the smallest sized tubes of any factory in this section, if not in the world.

Plans are being contemplated by the **Patent Button Company** to extend its plant to cover a large section of the land it owns in the vicinity of Brown, Water and North Elm streets. According to Alfred Hart, secretary of the firm, the plans for the new structure are under the personal management of the president, L. J. Hart, who is now out of the city. The latter has been given authority by the directors to go ahead with the arrangements. The new plant will double the company's capacity.

Waterbury manufacturers have had their attention called to the general trade mark law, passed in 1905, which grants the use of trade marks for a period of 20 years only. Many local manufacturers have failed to apply for a renewal and alarmed at this failure, the United States Patent Office has called attention to the fact that many foreign manufacturers are waiting for an opportunity to pre-empt trade marks and the local manufacturers face the possibility of direct competition from goods carrying their own valuable American trade marks. These trade marks will not be renewed without application.

Harvey Riggs, of 12 Crescent street, general accountant of the Scovill Manufacturing Company, has been named as a Commissioner of Education to fill a vacancy.

Health, and the art of keeping well were stressed by Dr. **George Tucker** of Hartford at the last month's meeting of the **Chase Foreman's Association.** An entertainment was given by local and out of town talent. **Timothy Terris** of the association gave a solo, **John Sidney** gave a monolog and **Martin** and **Storen** of Hartford entertained with an accordion act. The Chase Company orchestra furnished music for the dancing which followed. Those in charge of the entertainment President **Vincent Conway,** Vice-President **Thomas Baker,** Secretary **P. J. Shea,** Treasurer **Walter Jaeger, William Comber, Howard Richenback, John Jaeger** and **Thomas Bywater.**
—W. R. B.

BRIDGEPORT, CONN.

JULY 1, 1925.

Bridgeport's progress was strikingly shown at the Progress Week Exposition at Seaside Park, early last month. The **Bridgeport Brass Company** had an exhibit showing its history from 1865 by means of the varying products it manufactured at different times.

Beginning with hoop skirt parts in 1865, the exhibit showed samples of early brass wire; the micrometer invented by the company in 1867; the early brass lamps, patented bicycle searchlights; sample of the wire made by the company for the first long distance telephone line—New York to Boston; the engravers copper first made by the Bridgeport company; phono-electric wire used in the electrification of the New Haven road; the first electric brass melting furnace perfected by the company and modern products.

The company also had two booths, one showing a living room of the 1880 period and one of the present period, with Bridgeport brass products of each epoch. Features of the old room were an antique music box, the metal parts of which were made by the company and an antique electric fan, while the modern room contained a radio set and an electric fan, the parts of which are now made by the company.

The **Remington Arms—U. M. C. Company** exhibit contained samples of arms and cartridges which are used in every civilized and uncivilized country of the globe, made by the concern; cash registers and pocket knives. The exhibit showed how since the war the company had largely turned to the two latter products. It showed 201 samples of the 932 different styles of knives the company now makes. The company is now the largest manufacturer of this kind of goods in the world and its goods are sold in China, South America, South Africa, Australia and the Pacific islands in direct competition with English cutlery. The development of revolvers, shot guns and rifles made by the plant was also shown.

The **Singer Sewing Machine Company** exhibit contained the original model of the machine made in 1846 by **Elias Howe** and the original model of the **Wheeler & Wilson** machine of 1851. Over 70 sewing machines, none of them domestic styles, showed the little known uses for which special machines are built. One had an arm over two feet long and is used by the government in war balloon work. Special machines for leather work and for embroidery work were shown. Over 300 different types of machines are made by the concern.

Sale of the **Electric Cable Company** was held last month on order of the Federal Court of the Southern District of New York acting in receivership. The plant was bid in by the reorganization committee headed by **E. A. Potter** of the **Guaranty Trust Company.** The move is the final step in winding up the receivership along lines approved by a majority of the creditors. The industry has been one of the busiest since the war and will be put on a stable basis. Officials declare that expansion will follow the sale. The plant makes a variety of small sizes of drawn wire.

The immense West End plant of the **Columbia Phonograph Company** has been placed on the market and is in the process of being vacated. All activities are to be concentrated in the Barnum avenue plant to which additions will be made as soon as the West plant is sold. This latter plant has been idle for many months and its sale is expected to bring to the city a thriving new industry. The plant is of modern construction with six stories and is said to be valued at more than $1,000,000. Until it is sold a small wing will be retained for the manufacture of motors, tone arms and sound boxes. The company, under its present management, plans to operate conservatively, making only the highest grade machines and records. To accomplish this, it has already discared production methods and machinery of the older Columbia organization, according to works manager **R. A. Gloetzner.** It is the intent to operate by the end of the year at five times the present basis. Day and night shifts are now being operated.

The $25,000 damage suit brought by the **United Illuminating Company** against the **Bridgeport Brass Company** nearly three years ago and in preparation of which four judges of the Superior Court have been called upon for decisions on contested points of law brought before them on demurrers, has been assigned for trial before Judge Arthur F. Ells this month. The Illuminating Company claims that $20,781 is due under two contracts whereby it agreed to furnish power to the brass company dependent upon the price it had to pay for coal. The extra charge made by the Illuminating Company, it claims, was necessitated by its having to pay $7.50 a ton for coal during the life of the contract, while the brass company claims the price paid for coal should not have been over $6 a ton, "if purchased in good faith and in the exercise of sound business pudgment."

A crude oil combusition engine of the semi-Diesel type, wihich, it is claimed, will effect a saving of 70 per cent in fuel operating costs over existing similar engines is in course of development at the plant of the **A. H. Nilson Machine Company.** A feature of the engine is an apparatus which breaks up the oil into minute particles before exploding it, which reduces the carbon almost entirely. A small one has been placed in operation and provides eight horsepower for about 75 cents a day.

Gerard Swope, president of the **General Electric Company,** and a committee composed of officials and managers of the various plants of the company, visited the local plant, last month, on an inspection trip and made addresses to the employees.—W. R. B.

TORRINGTON, CONN.

JULY 1, 1925

A substantial addition to the plant of the **Torrington Manufacturing Company** is nearing completion. The addition is approximately 60 x 100 feet of mill construction, red brick, and is being erected at a cost of about $40,000. It is two stories high. The contractor is the **Torrington Building Company.** The addition, according to officers of the company, will be used largely for storage purposes.

Miss Charlotte M. Holloway, industrial investigator for the state department of labor, has finished an investigation of the industrial conditions in the Naugatuck valley. She found a marked improvement in many places and in all encouraging evidence of a revival of business. In no town did she find evidence of anything approaching an acute unemployment situation.

Major William E. Besse, superintendent of the **American Brass Company,** has purchased a beautiful country place in Winchester. The property consists of 100 acres bordering on Park pond and a large 14-room residence with other buildings. The former owner was Mrs. Blanch F. Powell of Croton Falls, N. Y.

Thomas W. Bryant of the **Union Hardware Company** is on a trip to Europe.

Robert C. Swayze of the **Torrington Manufacturing Company,** who was on a trip to Europe with **Judge James P. Woodruff,** has returned.—J. H. T.

NEW BRITAIN, CONN.

JULY 1, 1925

Generally speaking, conditions, insofar as local metal manufacturing is concerned, are good. All over the country big building projects are well under way and as these include not only the small home but also office structures, hotels and the like, there is a corresponding market for local products, especially those of the **American Hardware Corporation.** However, at the present time the demand has not reached any such proportions as to make it unseasonable.

All of the concerns here are about abreast of normal times. Working conditions seem satisfactory; business seems up with the average of other years and there is no indication that it will be any different during the summer months. Especially noticeable is the business done by **Landers, Frary & Clark,** which is specializing more and more in electrical apparatus and equipment and household electrical appliances. The American Hardware Corporation is doing well and the **Stanley Rule & Level Company,** makers of carpenter and builders' tools, likewise is maintaining a good business as are the **Stanley Works.**

The recently purchased **Traut & Hine Manufacturing Company** is now an integral part of the **North & Judd Manufacturing Company,** but no important changes in manufacturing products have been noted.—H. R. J.

PROVIDENCE

JULY 1, 1925.

One of the largest, most interesting, comprehensive and at the same time, important and valuable industrial expositions ever staged in this section of the country was conducted at the State Armory, Cranston street, Providence, June 22 to 27, inclusive, by the Association of Chemical Equipment Manufacturers and attracted widespread attention.

The exposition was conducted in connection with the sessions of the annual convention of the American Institute of Chemical Engineers, the Rhode Island Section of the American Chemical Society and the New England and Rhode Island Sections of the American Association of Textile Chemists and Colorists.

With 84 booths depicting in miniature practically every im-

portant phase and process in the chemical industry of this country today, the exposition was said to represent a factory plant valuation of more than $600,000,000. During the convention week visits were made to several of the local plants engaged in the production of metal goods and accessories, among these being the **Brown & Sharp Manufacturing Company,** with its production of machine tools and fine measuring instruments; the **Gorham Manufacturing Company,** where the silversmithing departments, the bronze foundry and other sections were inspected.

Among the exhibitors at the exposition were the following: **Aluminum Company of America,** Pittsburgh, Pa.; **American Manganese Bronze Company,** Holmesburg, Philadelphia, Pa.; **Baker & Co., Inc.,** Newark,, N. J., platinum laboratory ware and apparatus; **Egyptian Lacquer Manufacturing Company,** New York City, metal panels in lacquer enamels, applicable to non-ferrous-metallurgy industries; **Hoyt Metal Company,** St. Louis, Mo., lead burning exhibit; **International Nickel Company,** New York City; **Maurice A. Knight,** East Akron, O., acid-proof chemical stoneware, etc.; **Leeds & Northup,** Philadelphia; **Newark Wire Cloth Company,** Newark, N. J.; **Pfaudler Company,** Rochester, N.Y.; **Resisto Pipe & Valve Company,** East Cambridge, Mass., lead-lined pipes; **Schutte & Koerting Company,** Philadelphia; **United Lead Company,** New York City.

Easterbrooks-Smith, Inc., is the name of a new firm that has been incorporated under the laws of Rhode Island with an authorized capital of $10,000 to engage in the manufacture of plated and sterling silver novelties. The incorporators are Clarence J. Smith, Frank V. Willard and Robert W. Hamilton, all of whom are residents of Providence, R. I.

Z. Berberian Company has engaged **A. W. Alsfeld** to represent that concern on the road with its line of jewelers' supplies. Mr. Alsfeld has had about twenty-five years' experience as an electro-plater. Fifteen of these were with the Osthy & Barton Campany and recently he has been associated with the Karpeles Company.

S. H. Swallow, of the **W. H. Coe Company** of Providence was one of the representatives of the **United States Gold Leaf Manufacturers' Association** that appeared before the Tariff Commission in Washington recently. The association is asking an increase of 50 per cent in the duty on imported gold leaf under the flexible tariff provisions. Testimony was introduced to the effect that even with the present tariff, German manufacturers of gold leaf are able to sell in the United States at a price below the cost of manufacturing in this country.

Steps are being taken to accomplish the reorganization of the **Frank Mossberg Company** at Attleboro and several meetings have ben held recently by local bondholders and others financially interested, with the Attleboro Chamber of Commerce and the receiver, **Lewis A. Smith.** The result is that a reorganization of the concern and its continuance as an Attleboro business with a big future is assured.

Joseph J. Walton, of the **Mackenzie-Walton Company,** manufacturers of metal specialties and seamless tubing, reports that the plant is busy with good future orders already on file, and is running on full time. Products of the company are chiefly parts for precise instruments which requires a high type of skill to manufacture.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

JULY 1, 1925.

It is quite apparent to observers that business activities in the industrial sections of Rochester are still slowing up. With the approach of July and August, and with the annual inventory season close at hand, midsummer adjustment appear to be taking place and it is expected that there will be little change in conditions until September. Despite efforts on the part of some concerns to minimize the extent of slackened industry in Rochester, it is a fact that more men and women are out of employment in the city today than a year ago. Skilled workmen employed in departments using metals in all the large plants were laid off in March and are still unemployed unless they have accepted the situation and secured other employment.

There are a few exceptions to this rule in Rochester. The plant of the **General Railway Signal Company** in Lincoln Park is very busy and has been quite so since the beginning of the year. Heavy orders of railroad equipment for domestic and foreign shipment has been received here quite regularly, and this fact has greatly aided the industrial average in this city.

While it is announced that earnings of the **Eastman Kodak Company** have been fully as large as in recent years, not so many persons were employed. The same is declared to be quite true at the **Bausch & Lomb** optical works.

Purchasing agents report that stocks of copper, brass, tin and aluminum are low in Rochester, and that factory warehouses must be replenished before September 1st, as there are many indications to show that business is bound to make sharp progress so soon as the heated term has passed. In some of the larger manufacturing plants it is admitted that much of the dullness is due to a hand-to-mouth buying policy.—C. B. E.

NEWARK, N. J.

JULY 1, 1925

William H. Winter, Jr., secretary and treasurer of the **Andrew O. Kiefer Company,** Newark, N. J., until last February engaged in the manufacture of buckles and jewelry novelties at 18 Arlington street, Newark, N. J., has obtained an order from Vice Chancellor Church directing that concern to show cause why a receiver should not be appointed to liquidate its affairs. The company was chartered in 1920 and was later taken over by the complainant. It was alleged that the understanding was that the former owners were to pay all the then outstanding debts. This was not done and last January flames destroyed the factory. The petition gives the company's assets as $13,700 and liabilities as $700.

Herbert W. Royal has been appointed receiver for the **J. F. Brandies Corporation,** radio head set manufacturers of Newark, on application of creditors. Suits pending against the concern are understood to have influenced creditors to seek receivership.

The **Meeker Arms Company,** of Hartford, Conn., has purchased a plant at Somerville, N. J., and will begin operations there within a few weeks. The new plant space will be about 14,000 feet for machinery.—C. A. L.

TRENTON, N. J.

JULY 1, 1925.

Conditions are now very encouraging at some of the metal plants here and a number are not running full handed. While manufacturers are somewhat disappointed they are of the opinion that conditions will begin to improve soon. Statistics show a slight decrease in factory employment in New Jersey.

The **Pennsylvania Railroad Company,** named as defendant in a complaint against alleged unreasonable freight rates on zinc, filed by the **Federated Metals Corporation** of Trenton, N. J., made formal answer to the complaint in a brief submitted to the Interstate Commerce Commission at Washington, D. C. The Metals Corporation is seeking to disturb a group rate adjustment of long standing, the Pennsylvania and other railroads also complained against, averred in the briefs. Complaint was made recently that freight rates on spelter from the smelting plant at Trenton to Atlanta, Ga.; Birmingham, Ala.; Chattanooga, Tenn., and Alabama City, Ala., are unreasonable. The rate now charged from Trenton to Atlanta and Chattanooga is the sixth class rate of 81 cents per hundred pounds. The complainants are seeking a rate of 39 cents, to equalize their rates with those charged from certain western producing points. The Pennsylvania claimed that it had offered the complainants commodity rates of 50½ to 54½ cents, which they claimed to be reasonable in comparison with the rates from Ohio, Indiana and Illinois points.

Fire of undetermined origin recently damaged the top floor

of the plant of the **Trenton Brass & Machine Company.** The blaze started in the room where melting furnaces are used. The loss is about $1,000.

Oliver O. Bowman, treasurer of the **Jordan L. Mott Company,** who now makes his home at Spring Lake, N. J., recently slipped and fell at the Broad Street National Bank, Trenton, and fractured his hip. He is now confined to the McKinley Hospital, Trenton, under the care of specialists. Mr. Bowman, who was on his way to attend a meeting of the board of directors of the bank when the accident occurred, is 87 years old.

Some new incorporations receiving charters at Trenton recently included the following: **No-Tarnish Company, Inc.,** chemicals, $250,000 capital, Irvington, N. J.; **Radio Guild,** radio supplies, 1,000 shares; **Anthony Renshaw Electric Company,** electrical appliances, $100,000 capital, Camden, N. J.; **Dreadnought Electric Corporation,** electrical supplies, Plainfield, N. J.; **Brandeis Electric Manufacturing Corporation,** electrical supplies, $125,000 capital, Plainfield, N. J.; **Philkil Specialty Company, Inc.,** electrical devices, $100,000 capital, Trenton, N. J.—C. A. L.

PITTSBURGH, PA.

JULY 1, 1925.

Conditions in the metal industry are about the same as last month. Seasonable hardware is selling in large volume, although trade in that line will average close to 20 per cent below last year. Prices are firm. Radio equipment sales are slow, while electrical equipment trade is very fair. Industrial operations, as a whole, show comparatively little change, although some lines have reduced the number employed, and operations apparently averaged about 65 per cent of full capacity. Automobile trade is active, although trucks are not moving so well.—H. W. R.

MIDDLE WESTERN STATES

CLEVELAND, OHIO

JULY 1, 1925

Employment conditions in the metal trades continues steady in Cleveland and Northern Ohio territory. There will be an improvement, however, later in the summer when the construction of additions to metal foundries, now under way, are completed. According to figures given out by the Cleveland Chamber of Commerce, the metal trades, all branches included, form the backbone of Cleveland's industrial life. No less than 56,000 people are employed in various branches of the industry, while last year over $300,000,000 worth of business was done.

The **Ohio Brass Company** at Mansfield, Ohio, is building a third floor to its present two-story plant to cost $50,000. According to **L. W. Olson,** the new addition will house the technical department of the factory when completed.—S. D. I.

DETROIT, MICH.

JULY 1, 1925

It is announced by **A. C. McCord,** president of the **McCord Radiator & Manufacturing Company,** Detroit, that his organization has acquired the business of the **National Radiator & Manufacturing Corporation.** It is stated that the sale includes inventories, equipment, patents and good will, but not the plant and real estate. Through this purchase the McCord organization whose larger radiator customers have heretofore included Dodge Brothers, Studebaker, Hupp, Moon, General Motors Truck and Mack Truck, now adds to the list such companies as the Packard, Paige-Detroit, Rickenbacker and Velie.

The **Bundy Tubing Company,** 4845 Bellevue avenue, Detroit, is manufacturing in large quantities, copper, brass and steel tubing in sizes that have many applications, from a new process developed and patented by **Harry W. Bundy,** president of the organization. This tubing is produced from strip stock that is approximately twice as wide as the circumference of the tubing, and one-half as thick as the tubing wall. Briefly, this stock is first completely tinned in an automatic machine, and then rolled into a tube, soldered, accurately sized, and cooled in a single operation performed in another automatic machine. The stock is rolled twice about a complete circle so as to result in a double-wall thickness. The sweating produces a solid wall that appears as though the stock were double the actual thickness and rolled but once. In this rolling operation the tubing is produced at the rate of from 85 to 120 feet per minute. It is manufactured in various sizes from ¼ to ½ inch outside diameter and from No. 32 to No. 18 gage. In addition to the applications mentioned the tubing is used in place of push-rods for operating the valves of automobile engines; for feeding lubricant in various machine tools such as screw machines; feeding fuel to oil stoves and in certain novelties, such as air guns.

A dividend of 50 cents a share has been declared by the **C. M. Hall Lamp Company** on its issue of no par common stock. A further dividend of 50 cents was approved to be declared payable, 25 cents Sept. 15 and Dec. 15. These payments will increase the dividends in 1925 to $1.50.

The **Cadillac Motor Car Company** has completed its three new foundry buildings at a cost of $2,250,000 and within the last three weeks placed them in full operation. These buildings cover seven acres and from the last group necessary to complete a construction program begun several years ago. Floor space provided is in excess of 200,000 square feet. The group includes an aluminum foundry, brass foundry and core building. The use of manual labor has been reduced to the minimum. An illustration of this is the fact that the core sand is never touched by human hands or hand-wielding tool from the time it arrives in railroad cars until it reaches the core-maker's bench. With only the aid of a skimmer, a single operator fills the cylinder molds assembled on roller conveyors. The old hand-method required 21 men. The man who does the pouring of hot metals travels by monorail trolley to the cupola, there to obtain his supply of metal in his pouring ladle. Everything else in connection with these foundries is just as modern.—F. J. H.

CHICAGO, ILL.

JULY 1, 1925.

Chicago metal trades executives are interested in the fifth annual session of the National School for Commercial and Trade Executives, which will attract more than 300 commercial and trade association secretaries here on the occasion of its term from July 20 to Aug. 1, 1925. The school is conducted under the joint auspices of the Chamber of Commerce of the United States, National Association of Commercial Organization Secretaries, American Trade Association Executives and Northwestern University, where the classes will be held. John N. Van der Vrees, manager of the Central division of the Chamber of Commerce of the United States, is secretary of the board of managers of the school.

The purpose of the school is to provide practical training in chamber of commerce and trade association training.

While the metal business is reported as only fair, with a small margin of profit, conditions are better at this time than during the corresponding period of last year, according to metal houses.

Scrap metals have receded slightly during the past week, but market sentiment is better than it has been, and in most quarters it is believed that the present backward movement is only temporary. Copper was slightly higher during the latter part of last week, but lead, tin and zinc are reported as easier.

Metal consumers have been operating on a hand-to-mouth basis. There has been little forward buying because of the uncertainty.

Geier Corporation, of Illinois, 209 South LaSalle street, incorporated with capital of $25,000 to manufacture and deal in machines, tools, dies, models and patterns. Stanley B. Duedney, Claude D. Raber, H. J. Hickering, incorporators. Correspondents: Cassels, Potter & Bentley, The Rookery, Chicago.

Met-L-Wood Corporation, 2425 West 14th street, capital $50,000, to manufacture and deal in fabricated metal and wood panels, factory trucks, fire doors and similar articles. William Burry, Jr., I. R. Swanson, and C. C. Kendrick, incorporators. Correspondents: Burry Johnstone and Peters, 108 South LaSalle.

Mall Tool Company, 7159 Stoney Island avenue, Chicago, incorporated for $25,000 to manufacture and deal in tools, dies and patterns. Arthur Mall, A. L. Heald, R. M. Gaston, incorporators.

The **American Can Company** has let a general contract for a five-story concrete extension of their present plant to the Turner Construction Company. The extension will be 62 by 200 feet, and is estimated to cost about $175,000.—L. H. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

JUNE 15, 1925

The manufacture of medals is an important Birmingham industry, metal production being divided between this city and London, Birmingham being far and away the leading centre. The production of sporting medals has for many years been an active department of the jewelry trade, and at the present time is very well engaged. A serious grievance has developed in consequence of the **Royal Mint** taking up some months ago the manufacture of medals for general requirements. The Birmingham trade strongly complained that this was an unjustifiable invasion, by means of public plant and money, of their industry. The latest appeal was in March last, and in the middle of May the **Chancellor of the Exchequer** sent an official reply, through the city Chamber of Commerce, to the effect that he did not feel able to direct that the Mint shall completely abandon the manufacture of private medals, but is prepared to give an undertaking that no kind of advertising will be employed by the Mint, and that no private medals will be struck unless private individuals ask the Mint to do so.

The effect of the proposed re-imposition of the 33⅓ per cent duty on watches and clocks, which is to come into force on the 1st of July, has been a brisk buying movement. A large business is done in watches with Switzerland and in clocks with France and Germany. Many of the watches are coming over here untested and even unfinished. The watch and clock industries are largely on the decline and an immediate effect has been a serious check to the jewelry and electro-plate industries, retailers spending all their bank balances in the purchases of watches and clocks. The favorable reaction is not expected to arrive at least until the autumn.

The Birmingham brass and kindred industries have shown a decided recovery of late, and steady progress seems to be now the rule. Leading associations in the city have combined to form what is called an "Extended Uses Committee" which specializes on assisting the change-over from one class of manufacture to another, and this committee has done very good work. The substitution of copper tubes for lead in connection with water conveyance has made further progress, and this metal is now being adopted in nearly all the municipal building schemes throughout the country. In another direction, however, the building activity has been disappointing, the authors of these enterprises in many cases preferring wood and cast iron for door and window fitments and other details, partly on the ground of cheapness, but also to avoid the necessity of cleaning.

The jewelry trade has shown a decided improvement, and the workshops are better engaged than for many months past. The use of gilt jewelry, however, is extending, especially as the increase of technical skill and knowledge has facilitated a better imitation of the real article.

The change over of the government last autumn automatically terminated the progress of a bill introduced for the purpose of defining the various classes of gilt jewelry on which reforms have been sought as long since as four years ago. A new bill has, however, been introduced defining the tests and standards for "gold-cased" articles. In October, 1924, **Austen Chamberlain** suggested the necessity of a nitric acid test and with the aid of **W. R. Barclay,** president of the Birmingham Section of the Institute of Metals, a suitable test on this matter has been arrived at, and it is hoped that the Bill is now in a fair way of passing through Parliament. In connection with platinum the standard recommended is .950.

One of the developments in the copper trade, which has necessitated the finding of new employments of the metal is the extending use of steel instead of copper for locomotive tubes, and the increasing employment of Diesel engines which call for a smaller amount of metal than formerly. A change beneficial to leading companies, however, is the increasing demand for solid drawn phosphor bronze tubes and rods, especially for bushes in the automobile and other trades, their use superseding cast metal, with its accompanying expense and great waste. A comparatively new demand has been met with for a special kind of Britannia metal (pewter) for making up into candle sticks, vases, trays and various decorative articles. For this Scandinavia and Holland are important markets.

One Birmingham firm has lately introduced a new type of machine for drawing ornamental brass and copper moldings especially for shop window fitting, and the same machine is employed in connection with the fender kerb trade. Until lately, the straightening was done by hand, but it is now possible to do the work automatically, as the metal sections issue from the bench at a speed of 20 feet per minute.—H.

BUSINESS ITEMS—VERIFIED

Erie Enameling Company, 16th & Cascade streets, Erie, Pa., is erecting a building 120 x 140 ft., to cost $48,000.

J. M. Plating & Polishing Company has opened a job plating shop at 99 Peshine avenue, Newark, N. J., specializing in auto parts.

The **Luxor Electro-Plating Company** has opened a shop at 125 Baxter street, New York City, specializing in nickel and barrel plating.

Modern Brass Novelty Company has removed its plant to 124 Wooster street, New York, N. Y. This concern does all kinds of metal spinning and stamping.

Ernest Ewertsen, metal spinner, is now located at 109 Oliver street, Newark, N. J. This firm does spinning in all metals and makes a specialty of experimental work.

Ideal Plating Works, 29 Congress street, Newark, N. J., has taken the entire building at 145 N. J. R. R. avenue, and will occupy same after alterations are completed.

Contrary to report published in another journal, the **Dallas Brass & Copper Company,** 820 Orleans street, Chicago, Ill., announces that it is not in the market for any equipment.

Republic Flow Meters Company, Chicago, Ill., has opened an office at 617 Engineers Building, Cleveland, Ohio, in charge of L. C. Wilson,, formerly of the Pittsburgh office.

Hoffman Triplex Lock Company has removed to 89 Center street, New York City. This concern manufactures burglar-proof locks, said to be endorsed by the leading insurance companies.

The **Endwell Machine & Tool Company** has removed to 210 Centre street, New York City. This concern makes tools and dies, and does light manufacturing and metal stamping for the trade.

The **Enners Plating Works** have removed to 209 West 30th street, New York City. This concern does plating on automobiles, piano parts, and plumbing material as well as gas and electric fixtures.

N. O. Nelson Manufacturing Company, 10th and Chestnut streets, St. Louis, Mo., awarded the contract for the construction of a building approximately 200 x 300 ft., to be used entirely as a warehouse; estimated cost $150,000.

Royal Plating & Polishing Works have opened a shop at 144 Bleeker street, Newark, N. J., where they will do a general job plating business in brass, copper and nickel. The company will make a specialty of automobile parts and hardware.

Thomas Bradley, has leased the upper floor at 210 Water street, Paterson, N. J., and as soon as alterations are completed will remove his plating shop to these premises. The following departments are operated: plating, polishing, lacquering.

Springfield Bronze Company, Inc., 66 Charles street,

Springfield, Mass., is building an addition to its plant, and will continue to manufacture high grade alloy castings. This firm operates the following departments: brass, bronze and aluminum foundry.

The **Walker Plating & Polishing Company**, of 88 Walker street, N. Y. C., has added a department for white metal casting for the manufacture of candle sticks and vases. This firm operates the following departments: casting, plating, polishing, lacquering.

Schaff & Good Company, Fremont, Ohio, plans the construction of a 2-story factory for the manufacture of cutlery products, to replace fire loss; estimated cost $50,000. This firm operates the following departments: tool room, grinding room, plating, polishing.

Backmeier Sales Corporation, with general offices in Cincinnati, Ohio, and branch warehouses in Atlanta, Georgia, and Dallas, Texas, have been appointed manufacturer's agents, to handle and promote the sale of United States electrical tools in the 14 southern states.

Hammond Brass Works, Inc., Hammond, Ind., plans to rebuild the portion of its works destroyed by fire May 30th, with loss of $75,000 including equipment. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, tool room, grinding room, plating, polishing.

Manufacturing Equipment & Engineering Company, Framingham, Mass., is having plans prepared for the construction of a 60 x 200 ft. factory addition and 50 x 70 ft. japan building. Estimated cost $50,000. Chas. T. Main, 200 Devonshire street, Boston, architect. This firm operates a japanning department.

Wm. Bergfels & Company, metal spinners of 393 Mulberry street, Newark, N. J., have taken the floor in the adjoining building 391 Mulberry street, thus increasing their floor space. They have installed additional machinery and are now prepared to turn out work of any size. They also specialize in oval spinning.

The **Crescent White Metal Company, Inc.,** has removed to larger quarters at 43 S. 6th street, Newark, N. J. This concern manufactures white metal novelties for the trade, as well as a line of advertising specialties. The following departments are operated: casting, cutting-up shop, soldering, plating, lacquering.

E. R. Wagner Manufacturing Company, North Milwaukee, Wis., manufacturer of hardware specialties, electro-plated parts and materials has recently completed construction work to enlarge the plant and capacity. The capitalization has been increased. E. R. Wagner is president and general manager. This firm operates the following departments: tool room, plating, japanning, stamping, polishing.

Michigan Copper and Brass Company, Detroit, Mich., is starting on a program of reconstruction and extensions which involves an expenditure of about $350,000. This means changes in the rolling mill which does away with the steam plant, puts equipment on 100 per cent motor-driven basis, and also increases the company's rolling mill capacity to some extent.

F. M. Flander, formerly superintendent of the Independent Stove Works, Owosso, Mich., has started a foundry in that city to manufacture brass, bronze and aluminum castings. Mr. Flander also was connected with the Standard Machine Company, Owosso. The following departments will be operated: Brass, bronze, aluminum foundry; plating, polishing.

H. E. S. Thompson Company, Attleboro, Mass., has purchased a piece of property which will take care of its expansion, having over 5,000 sq. ft. of floor space, as well as the best of light. This company has been in business since 1909 starting in its present location, gradually adding to its space until for the past seven years it has occupied the entire floor.

Work has been started on the erection of a factory building for the **Day & Night Water Heater Company,** in Monrovia, Cal., to house the former Triangle Heater assembly plant formerly located on Orange avenue, Monrovia, but recently destroyed by fire. Hamm & Grant, Inc., architects and engineers, 607 Ferguson building, Los Angeles, prepared the plans and are erecting the building for the owners.

Fire, May 26, destroyed a portion of the nickel-plating department at the 3-story plant of the **Buffalo Dental Manufacturing Company,** 145 Kehr street, Buffalo, N. Y., manufacturer of dental instruments, etc., with loss estimated at $25,000. The company has rebuilt its factory, and is in operation again. The following departments are operated: tool room, grinding room, brazing, plating, japanning, polishing, lacquering.

Frankelite Company, D. Frankel, president, 5016 Woodland avenue, Cleveland, Ohio, awarded contract for the construction of a 3-story plant for the manufacture of lighting fixtures on East 51st street, to replace fire loss. Estimated cost $40,000. This firm operates the following departments: brass machine shop, tool room, grinding room, cutting-up shop, spinning, plating, stamping, soldering, polishing, lacquering.

H. S. Getty & Company, Inc., manufacturers of brass and bronze hardware, 1539 Cabot street and 1415-17 Germantown avenue, Philadelphia, Pa., have recently purchased a tract of land and are now erecting their first unit consisting of a modern daylight building, two-story factory building, 40 x 80 ft., and one-story brass foundry, 30 x 75 ft., adjoining, to cost approximately $50,000, located at 10th and Thayer streets, which they will occupy about September 1, 1925.

Wissler Instrument Company, 601 N. Broadway, St. Louis, Mo., has purchased the entire stock and equipment of the St. Louis Machine Tool Company, 932 Loughboro avenue, St. Louis, and will continue to manufacture and distribute its entire line of St. Louis ball and roller bearing polishing machines, St. Louis tapping machines and tapping chucks, Western grinders and polishing machines in all sizes and styles. The company will also be in position to supply parts for these machines, sold in the past; in fact continue the business of the St. Louis Machine Tool Company.

ELECTRICAL APPARATUS AND SUPPLIES

The Department of Commerce announces that, according to the data collected at the biennial census of manufacturers, 1923, the total output of electrical machinery, apparatus, and supplies in the United States during that year was valued at $1,304,650,999, an increase of 59.4 per cent as compared with $818,415,159 in 1921, the last preceding census year.

Of the total for 1923, $184,510,010 was contributed by insulated wire and cable, $127,212,066 by motors and parts (not including controllers and automotive starters), $124,630,467 by batteries, $90,857,998 by telephone apparatus, $71,967,458 by incandescent lamps, and $67,002,084 by household apparatus and appliances.

METAL FOR THE STEAMSHIP "MALOLO"

The order for the rolled brass tube sheets for the main condenser of the "Malolo" the new steamship that is the largest high-powered passenger steamship ever built in the United States and that is now building at the yards of the Wm. J. Cramp Ship & Engine Building Company, Philadelphia, Pa., for the Matson Navigation Company, under the supervision of Gibbs Brothers, Inc., her designers, has been placed with the **Detroit Copper & Brass Rolling Mills**, of Detroit, Mich.

These tube sheets will be four in number, 1¼ inches thick and each 10 ft. 2 in. in diameter. There will be over 9 tons of brass in the order.

The **Whitehead Metal Products Company,** of Philadelphia, Pa., has received the order for 1,188 ft. of Monel metal strip for the nozzle blades of the same ship. This strip will run from ⅛ by 1 11/16 ins. to 3/16 by 4 1/16 ins.

The order for the blading material has been placed with the **American Brass Company,** of Waterbury, Conn. There will be 4,035 ft. of hard drawn brass blading material, 1,860 ft. of Monel metal blading and 5, 600 ft. of manganese copper blading. The hard drawn brass will be 68 per cent minimum to 72 per cent maximum copper and remainder zinc. To be annealed and run no more than one-half per cent lead and one-half per cent other impurities. The manganese blades to be electrolytic copper plus three per cent to four per cent manganese; not more than 0.30 per cent impurity and to pass the mercurous nitrate test. Monel metal to pass the United States navy specifications. In addition to the foregoing the same firm has received orders for 8,290 ft. of hard drawn brass packing material and dummy and gland strip material.

PLATINUM AND ALLIED METALS IN 1924

The United States produced 315 ounces of crude placer platinum in 1924, of which Alaska produced 6 ounces, California 285 ounces, Oregon 20 ounces, and Utah the remainder, according to a statement issued by the Department of the Interior, prepared from mine reports by James M. Hill, of the Geological Survey. These figures show a decrease of 294 ounces as compared with 1923, practically all of which may be attributed to loss of production in California.

REFINED PLATINUM

Reports received from platinum refiners in the United States show purchases of crude platinum in 1924 from domestic sources as follows: Alaska 5 ounces, California 161 ounces, Oregon 24 ounces, Utah 2 ounces, a total of 192 ounces; from foreign sources: Australia 1,041 ounces, Canada 5 ounces, Colombia 56,387 ounces, and Russia 7,046 ounces, a total of 64,479 ounces.

The refined platinum metals recovered from crude platinum, from ore and concentrates, and from gold and copper refining amounted to 66,007 ounces, of which 7,280 ounces is believed to have come from domestic materials.

SECONDARY METALS RECOVERED

Refiners report the recovery from scrap treated in 1924 of 54,471 ounces of platinum metals, an increase of 6,599 ounces as compared with 1923.

IMPORTS

Platinum metals imported for consumption in the United States, in 1924:*

Metal	Troy ounces	Value
Platinum or crude platinum and unmanufactured products, ingots, sheets, wire, etc.	95,364	$9,791,644
Platinum, manufactures of, except jewelry	17	2,367
Iridium	1,397	214,384
Osmiridium	1,446	174,460
Osmium	350	38,931
Palladium	10,388	669,478
Rhodium	1,166	105,770
Ruthenium	882	45,846
	111,010	$11,042,880

*Compiled from records of the Bureau of Foreign and Domestic Commerce, Department of Commerce.

CONSUMPTION

Platinum metals consumed in the United States as reported by refiners, 1924, by industries, in troy ounces:

Industry	Platinum	Iridium	Palladium	Others	Total	Percentage of total
Chemical	10,507	122	436	403	11,468	7
Electrical	16,588	1,269	3,099	...	20,956	13
Dental	11,092	131	10,049	...	21,272	13
Jewelry	87,151	2,204	12,480	746	102,581	62
Miscellaneous	5,012	634	2,122	973	8,741	5
	130,350	4,360	28,186	2,122	165,018	100

STOCKS

At the end of 1924 stocks of crude platinum metals in the hands of refiners was 74,539 ounces, an increase of 3,814 ounces as compared with stocks on January 1, 1924.

ELECTRO-PLATING RUBBER

The world may soon be wearing electroplated overcoats it was brought out at the session of the rubber division of the American Chemical Society at Johns Hopkins University, Baltimore, Md.

Dr. S. E. Sheppard of Rochester, N. Y., declared the development of a process known as the electro-deposition of rubber, by which fabrics, after they have been fashioned complete, may be covered by a leak-proof layer of rubber.

It is possible in this new way, according to Dr. Sheppard, to make an overcoat complete and plate the rubber electrically on the finished garment so as to avoid completely all danger of parting of the seams. Rips will thus disappear.

GOLD FROM MERCURY

Bits of porcelain containing microscopic specks of gold that once was mercury were presented to Dr. George F. Kunz, of Tiffany & Company, New York, by Dr. H. Nagaoka of Tokio, the "Japanese Einstein," who is credited with having succeeded in producing artificial gold by disintegrating atoms of quicksilver in an electrical field of several million volts per centimeter.

"We have also obtained from the quicksilver a white metal which we have not been able to identify," he said. "We can prove that it is not platinum, but can't tell what it is. It occurs in such small quantities that it defies ordinary methods of analysis. The mercury may be changed into still other substances, but we haven't any further evidence on it. It appears, however, that the changes which are forced on the atom are somewhat complex."

Dr. Nagaoka said he thought the white metal later detected might be tin. He thought other changes of atoms might be produced by his process. "Perhaps tin may be changed into cadmium and cadmium into silver," he said. The total amount of gold produced by Dr. Nagaoka's laboratory so far has a market value of a fraction of a cent. Dr. Nagaoka said he did not know whether the process could be applied economically on a large scale.—New York Times.

INCORPORATIONS

The **General Die Casting Company,** Stock Exchange Building, Philadelphia, Pa., recently organized, has begun the construction of a plant. T. S. Thomas is president; J. N. Pomeroy, vice-president, and F.C. Morrison, general manager.

The property of the **Baltimore Valve Company,** Baltimore, Md., has been acquired by new interests and will be operated under the name of the **Baltimore Valve Corporation.** The officers of the new organization are W. Fairfield Peterson, president; Julian H. Marshall, vice-president and treasurer; W. F. Brune, secretary; E. F. A. Morgan, assistant treasurer. The following departments will be operated: brass machine shop, tool room, grinding room, plating.

Lavigne Brass Company, 5457 Lincoln avenue, Detroit, Mich., has been incorporated to manufacture valves and fittings, for which equipment is being installed, and expects to begin production in about six weeks. It will organize distribution through jobbers. This firm will operate the following departments: smelting and refining; brass, bronze and aluminum foundry; brass machine shop, tool room, grinding room, casting shop, cutting-up shop, spinning, plating, polishing.

The **Pennsylvania Foundry Supply Company,** Liberty Building, Philadelphia, Pa., has been incorporated with a capitalization of $100,000 to take over a manufacturing plant and open branch warehouses. The officers of the company are S. B. Wentz, president; M. E. Mandel, secretary and treasurer. Mr. Mandel will have charge of the selling organization and a branch warehouse will be established at York, Pa., under the supervision of M. F. Carr, who has been in the foundry supply business for the past 30 years. This firm will operate the following departments: stamping, tinning.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$850	$900
American Hardware Corporation	100	86	88
Anaconda Copper	50	39⅜	39⅝
Bristol Brass	25	6	8
International Nickel, com	25	29⅞	30⅛
International Nickel, pfd	100	98½	99½
International Silver, com	100	165	175
International Silver, pfd	100	106	109
National Enameling & Stamping	100	30½	31½
National Lead Company, com	100	149	151
National Lead Company, pfd	100	116	119
New Jersey Zinc	100	185	190
Rome Brass & Copper	100	135	145
Scovil Manufacturing Company	..	225	230
Yale & Towne Mfg. Company, new	..	64	66

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

PLAN TO SIMPLIFY SHEET METAL WARE

Simplification committees of the sheet metal ware industry have begun in real earnest the consideration of what items among the hundreds of varieties now being catalogued by that industry may be eliminated to the mutual benefit of the manufacturer, distributor and user, it was announced today by the Division of Simplified Practice, Department of Commerce. Meetings of these committees have been held in connection with sessions of the Sheet Metal Ware Association at the United States Chamber of Commerce. The presence of the members in Washington offered opportunity for conferences with representatives of the Federal Specifications Board and the Bureau of Standards who are directly interested in these commodities.

The studies of simplification possibilities are being taken up in three divisions, one being devoted to enameled ware, one to black iron and galvanized ware and one to tin ware. The first is headed by W. Topping of the Columbian Enameling & Stamping Company of Terre Haute, Ind. Fenton Lawson of the F. H. Lawson Company of Cincinnati is head of the second group, and E. M. Blake of the Central Stamping Company, New York City, has been made head of the tinware committee.

Review of the Wrought Metal Industry

Written for The Metal Industry by J. J. WHITEHEAD, President, Whitehead Metal Products Company of New York, Inc.

JULY 1, 1925.

Conditions in the brass and copper business during the month of June were very little changed from those existing in May. There was a slight flurry in ingot metal, but no change was reported in rods, sheets, tubes or wire. Most of the mills are fairly busy in all departments with no special emphasis placed on any product except sheet copper. In these departments there is much activity and many have more orders on their books than they have had for some time past. This is largely due to the great demand arising from the continued activity in the building trade. It is becoming more and more evident that architects, owners and even speculative builders are specifying brass pipe and sheet copper for their plumbing and roofing to a degree heretofore unheard of.

Aside from this, however, there are few if any indications of activity on any other basis than a more or less "hand to mouth" buying operation, and a continuation of the strenuous activity on the part of the various mills to secure all orders possible, resulting in a keenly competitive price condition.

The trend toward heavy consumption of white metals such as nickel, nickel silver and Monel metal still continues. Some very large contracts for pure nickel cooking utensils for equipping some of the important hotels throughout the country, such as the new Palmer House in Chicago and the St. Francis Hotel in San Francisco, have recently been placed, and there are specifications now being made up for others. This indicates the progress that has been made in introducing pure nickel equipment in the larger hotels and restaurants throughout the country. Monel metal trim in restaurants and hotels for use in steam tables, pantry shelves and similar items has become so well established because of the proved service which the metal gives, that the demand from this source is constantly increasing. Another important development in the use of Monel metal is found in the extension of this use to soda fountain and ice cream cabinets. It has been found by actual service tests that Monel metal around a soda fountain for trimming, workboard, lining tanks and refrigerators as well as for the top covering is superior to anything that has heretofore been used.

The exhaustive investigations which are being made into losses arising from corrosion in various industries has been of considerable value as a stimulant to the metal trade. It has been known for some time that the cost of replacing parts made from metals that will corrode is enormous, but it is only recently that actual statistics have been compiled. Manufacturers in various lines are now turning their attention to figures showing the cost of upkeep of equipment, with the result that many are becoming converted to the policy of paying a higher first cost because the use of the alloys of copper and nickel are the cheapest in the end. Educational work of this kind is responsible for many developments that have had a tendency to stimulate the industry, and the continuation of this work cannot fail to be of enormous value to the entire trade.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

JULY 1, 1925.

Large purchases of copper by domestic manufacturers and substantial buying for export were the notable features in June. The increased market activity naturally was favorable to better prices. Quotations moved up to 13¾ cents, delivered, from a low of 13⅜ cents earlier in the month. The buying movement was extensive and reached an estimated total of from 80,000,000 to 100,000,000 pounds, with shipments spread over next three months. Offerings were freely absorbed, and the heavy demand was in keeping with the forecast in our June number.

Notwithstanding the active buying recently recorded, and the continuous heavy export movement, the market soon lost tone and showed a decided downward trend. The trade realizes that there is no question about supplies being fully adequate for the needs of industry, and, furthermore, that production is at a sensational rate. There is, therefore, not much chance for the market to advance greatly while output is maintained at the present rate. Present quotations are 13¾ cents delivered in Connecticut Valley and about 13½ cents at steamer side New York. These prices are slightly firmer than a few days ago.

ZINC

Demand for zinc lately was confined to limited quantities. Prices held fairly steady during June, but buyers are very conservative even at what producers feel is not a very remunerative basis. The market is well above the price a year ago, however, and with an increase in the foreign output, consumers are naturally averse to follow any attempt at an upward move. Consumption appears to be on a fair scale. A seasonal curtailment of ore production is looked for in early July, and any reduction in output should help market prospects. New York price quotes 7.35 cents for prime Western slab zinc, and 7 cents at East St. Louis. Market steady.

TIN

Recent sales of tin in the New York market were on a more liberal scale. Domestic consumers and dealers showed renewed interest and covered requirements more generously than for sometime past. Full prices were realized lately for round tonnages, but the immediate response in the London market was disappointing. The outlook here was for an advance in the foreign quotations, but the European cables showed a decline when the expectation was that London would show a fresh display of strength.

A firmer tone developed in London later, and New York prices were also marked up a fraction higher. American consumers bought freely for nearby and future positions during the last ten days of June. Demand from the consuming trade was the most active in several weeks. The significant feature was the fact that substantial purchases were made at some of the highest market levels in months. As this report closes prices are firm at 56¼ @56⅝c for July Straits.

LEAD

Conditions in the lead market have been more favorable for buyers lately. Supplies are available at 8.20c New York basis and 7.85c in the St. Louis district. Present values are more than half a cent per pound under the prevailing prices in the outside market at the beginning of June. Current prices compare with 10½c in January, 9c early in March and 7¾c in April. The buying has been in light volume lately, but producers believe they will have an outlet for their product in the second half of the year. Production has increased with the abnormal rise in prices. Buyers, however, are not so eager to stock up as they were. If supplies accumulate with producers the trade may be able to place orders on a more reasonable basis.

ANTIMONY

The market has been lightly supplied for some time past. The unsettled condition of affairs in China has made it difficult to transact business with any definite assurance that shipments would arrive on schedule time. Holders and importers are taking advantage of the force majeure clause in selling antimony either afloat or for shipment. The price quoted is firm at 16¼@16½c, duty paid, and about 15@15¼c for lots afloat and due in August.

ALUMINUM

A good volume of business continues in aluminum. Prices are consequently maintained at the level of 28c for 99 per cent plus and 27c for the 98-99 per cent quality. Inquiries are received with regularity, and practically all producers are importers find a ready outlet for all the stock they decide to offer. The various consuming industries are using up a good tonnage of both virgin and secondary metal. The stable condition of virgin aluminum is a noteworthy feature of the situation.

PLATINUM

Sellers quote $120 an ounce for refined platinum. It is possible that concessions would be given from this figure. Current sales are apparently moderate.

SILVER

The situation in silver has improved somewhat, and market price has developed an upward trend. If consumption in Europe increases, as was the opinion, and China and India begin to accumulate large stocks, prices should reflect the improved conditions in the near future. Recent price for silver bullion rose to 70½c an ounce. It eased off to 70¼c later on a slight drop in the London quotation. Germany and Russia are possible buyers, and European demand could readily prove an important factor.

OLD METALS

A fairly good volume of scrap material changed hands in June. The market rises and falls with fluctuations in the primary metals, but dealers and consumers operate with caution, especially when the new products develop signs of weakness. Export demand for certain grades of brass and composition afforded an outlet for considerable stock. Refiners have taken substantial shipments of old copper. Quoted prices dealers are willing to pay are 10¾@11c for heavy copper; 8¾@9c for new brass clippings, 9@9¼c for light copper, 6¾@7c for heavy brass, 5½@5¾c for light brass, 4½@4¾c for battery lead, 7¼@7½c for heavy lead, and 21½@22c for aluminum clippings.

QUICKSILVER

Demand is only moderate, but price quotes $83.50 for 75 pound flask lots on spot. The import price quotes £14 5s. London basis, but this is considered too high to attract buyers. Foreign holders are firm.

WATERBURY AVERAGE

Lake Copper—Average for 1924, 13,419—January, 1925, 15.125—February, 15.00—March, 14,375—April, 13,625—May, 13.625—June, 13.75.

Brass Mill Zinc—Average for 1924, 7.10—January, 1925, 8.60—February, 8.00—March, 8.10—April, 7.60—May, 7.55—June, 7.55.

Daily Metal Prices for the Month of June, 1925

Record of Daily, Highest, Lowest and Average

	1	2	3	4	5	8	9	10	11	12	15	16	17
Copper (f. o. b. Ref.) c/lb. Duty Free.....													
Lake (Delivered)	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.625	13.70	13.75	13.75
Electrolytic	13.50	13.50	13.45	13.45	13.45	13.40	13.30	13.35	13.30	13.40	13.50	13.60	13.60
Casting	13.10	13.10	13.05	13.05	13.05	13.00	13.00	13.00	13.00	13.00	13.10	13.15	13.15
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb													
Prime Western	7.075	7.025	7.00	7.00	7.075	7.05	7.00	7.00	6.975	6.95	7.05	7.00	7.00
Brass Special	7.175	7.125	7.125	7.125	7.175	7.15	7.10	7.10	7.10	7.10	7.15	7.15	7.10
Tin (f. o. b. N. Y.) c/lb. Duty Free.....													
Straits	55.50	55.00	54.875	55.375	56.125	55.75	55.50	55.50	55.25	55.00	56.125	56.375	56.00
Pig 99%	54.50	54.00	53.875	54.375	55.125	54.75	54.375	54.375	54.25	54.00	55.25	55.50	55.25
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb	8.60	8.60	8.60	8.55	8.55	8.40	8.40	8.30	8.30	8.10	8.00	8.00	8.00
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.													
Ingot	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Shot	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	16.75	16.50	16.50	16.00	16.50	16.50	16.50	16.50	16.75	17.00	16.75	16.75	16.75
Silver c/oz. Troy Duty Free	68.50	68.625	68.875	68.50	68.125	68.75	68.50	68.75	68.875	68.75	68.875	69.125	68.75
Platinum $/oz. Troy Duty Free.....120		120	120	120	120	120	120	120	120	120	120	120	120

	18	19	22	23	24	25	26	29	30	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free.....												
Lake (Delivered)	13.875	13.875	13.875	13.875	13.875	13.75	13.75	13.875	13.875	13.875	13.625	13.731
Electrolytic	13.60	13.55	13.50	13.50	13.45	13.45	13.40	13.55	13.55	13.60	13.30	13.470
Casting	13.25	13.20	13.15	13.15	13.10	13.00	13.00	13.20	13.20	13.25	13.00	13.091
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb												
Prime Western	6.95	6.95	7.00	7.00	7.00	7.00	7.00	7.025	6.95	7.075	6.95	7.003
Brass Special	7.10	7.10	7.10	7.125	7.10	7.10	7.10	7.15	7.10	7.175	7.10	7.126
Tin (f. o. b. N. Y.) c/lb. Duty Free.....												
Straits	56.125	56.125	56.125	56.50	56.375	56.125	56.25	57.125	57.125	57.125	54.875	55.920
Pig 99%	55.25	55.125	55.125	55.375	55.25	55.00	54.75	55.75	55.50	55.75	53.875	54.852
Lead (f. o. b. St. L.) c/lb. Duty 2¼c/lb	8.00	7.95	7.90	7.90	7.85	7.85	7.85	7.75	7.70	8.60	7.70	8.143
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Shot	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Electrolytic	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	16.625	16.75	16.75	16.75	16.50	16.50	16.50	16.75	17.00	17.00	16.00	16.361
Silver c/oz. Troy Duty Free.....	68.75	68.75	69.375	70.00	70.00	70.375	70.50	70.25	69.25	70.50	68.125	69.102
Platinum $/oz. Troy Duty Free.....120		120	120	120	120	120	120	120	120	120	120	120

Metal Prices, July 6, 1925

Copper: Lake, 14.00. Electrolytic, 13.80. Casting, 13.25.
Zinc: Prime Western 7.10. Brass Special, 7.20.
Tin: Straits, 57.375. Pig, 99%, 55.625.
Lead: 7.85. **Aluminum,** 28.00. **Antimony,** 18.50.
Nickel: Ingot, 34.00. Shot, 35.00. Electrolytic, International Nickel Company, 38.00. (In effect June 1, 1925).
Quicksilver, flask, 75 lbs., $84.50. **Silver,** oz., Troy, 68.875.
Platinum, oz. Troy, $120.00. **Gold,** oz. Troy, $20.67.

Metal Prices, July 6, 1925

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10½to11½
Brass Ingots, Red	10¾to12½
Bronze Ingots	12 to13
Bismuth	$2.65to$2.70
Cadmium	60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.60
Manganese Bronze Castings	22 to40
Manganese Bronze Ingots	12 to16
Manganese Bronze Forging	34 to42
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	18¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	18 to21
Phosphor Copper, guaranteed 10%	17¼to20½
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	60 to70
Silicon Copper, 10% ....according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
12¼to12½	Heavy Cut Copper	13¼to13¾
12 to12¼	Copper Wire	13 to13½
10¼to10½	Light Copper	11½to12
9¼to 9½	Heavy Machine Comp	10¾to11¼
7¾to 8	Heavy Brass	8¾to 9¼
6¾to 7	Light Brass	8 to 8¼
8¼to 8¾	No. 1 Yellow Brass Turnings	9¾to10
8½to 9	No. 1 Comp. Turnings	10 to10½
8 to 8¼	Heavy Lead	8¾to 9
4¾to 5	Zinc Scrap	5¾to 6
10	Scrap Aluminum Turnings	12 to14
16 to17	Scrap Aluminum, cast alloyed	18 to19
20	Scrap Aluminum, sheet (new)	23 to25
32	No. 1 Pewter	36 to38
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect April 24, 1925

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.18⅛	$0.19⅞	$0.21⅞
Wire	.18⅝	.20⅜	.22⅜
Rod	.15⅞	.20⅝	.22⅝
Brazed tubing	.26⅛	.....	.31⅝
Open seam tubing	.26⅛	.....	.31⅝
Angles and channels	.29⅛	.....	.34⅝

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅛	$0.20⅞	$0.22⅞
Wire	.19⅝	.21⅜	.23⅜
Rod	.16⅞	.21⅝	.23⅝
Brazed tubing	.27⅛	.....	.32⅝
Open seam tubing	.27⅛	.....	.32⅝
Angles and channels	.30⅛	.....	.35⅝

SEAMLESS TUBING

Brass, 22¾c. to 23¾c.
Copper, 23¾c. to 24¾c.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	20⅛c. net base
Muntz or Yellow Metal Sheathing (14"x48")	18⅛c. net base
Muntz or Yellow Rectangular sheet other Sheathing	19⅛c. net base
Muntz or Yellow Metal Rod	16⅛c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	20¾c. to 21¾c. net base
From stock	21¾c. to 22¾c. net base

BARE COPPER WIRE—CARLOAD LOTS

16c. to 16¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	20¼c. net base
100 lbs. to 200 lbs. in one order	20¾c. net base

ZINC SHEET

Duty, sheet, 15% Cents per lb.

Carload lots, standard sizes and gauges, at mill, less 8 per cent discount 10.25 basis

Casks, jobbers' price	11.50 net base
Open Casks, jobbers' price	12.00 to 12.25 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	25¼c.
15%	"	27¼c.
18%	"	28¼c.

Nickel Silver Wire and Rod

10%	"	28¼c.
15%	"	32¼c.
18%	"	35½c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs. 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 73¼ to 75¼c. per Troy ounce, depending upon quantity.

Rolled sterling silver 70¼c. to 72¼c.

NICKEL ANODES

90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Supply Prices, July 6, 1925

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.14–.16
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., Carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.25¼–.28¾
Denatured in bbls	gal.	.60–.62
Alum—		
Lump Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech., bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, kegs	lb.	.08
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.33
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide	lb.	.50
Sulphate, bbls	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.01½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—		
Carbonate dry, bbls	lb.	.29
Chloride, 100 lb. lots	lb.	.22½
Salts, single bbls	lb.	.10½
Salts, double bbl.	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.093
Potassium Bichromate, casks (broken)	lb.	.08¾
Carbonate, 82-92%, casks	lb.	.06¼
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.70
Nitrate, 100 ounces lots	oz.	.48
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.22
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03¾
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.40
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.11
Chloride, 600 lb. lots	lb.	.08
Cyanide	lb.	.41
Sulphate, bbls	lb.	.03½

COTTON BUFFS

Open buffs, per 100 sections (nominal),

12 inch, 20 ply, 64/68, unbleached sheeting	base,	$32.40-	$40.85
14 inch, 20 ply, 80/96, " "	base,	45.25-	50.80
12 inch, 20 ply, 80/96, " "	base,	47.35-	46.20
14 inch, 20 ply, 84/92, " "	base,	63.15-	62.25
12 inch, 20 ply, 88/96, " "	base,	.....	63.25
14 inch, 20 ply, 88/96, " "	base,	.....	85.15
12 inch, 20 ply, 80/96, " "	base,	.....	52.70
14 inch, 20 ply, 80/96, " "	base,	.....	70.80
Sewed Buffs, per lb., bleached and unbleached	base,	.55 to	.75

FELT WHEELS—VARIOUS BRANDS

		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	$3.00	$2.65
" 6" 8" and over 16"	1" to 3"	3.10	2.75
" 6" to 24"	Over 3"	3.40	3.05
" 6" to 24"	½" to 1"	4.00	3.65
" 4" to 6"	¼" to 3"	4.85 }	Any quantity
" Under 4"	¼" to 3"	5.45 }	

Grey Mexican or French Grey—10c. less per lb. than Spanish, above.

	White Spanish 6" to 18"	Over 18"	Under 6"
Over 3"	$3.00	$3.30	$3.75
1" to 3"	2.60	2.70	3.75
Under 1"	3.30	3.60	3.75